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An Analysis of the Results of a Learning Test

IRVIN T. SHULTZ, Associate Professor of Psychology and Director of High School Student Teaching, Butler University, Indianapolis

LEARNING may be defined as the elimination of variety from responses to a specific stimulus, that is, learning is the acquisition of skill in the performance of a task. Learning, a major psychological topic, has had a long and reputable history. Aristotle was probably the first to grapple with the problem, and we have, in his contribution, its modern statement in terms of the primary and secondary laws of association. The psychologist of today is also much interested, as is evidenced by the tremendous amount of experimental investigation that is being done or has been done, in both the animal and the human aspects of learning.

There are three important theories of learning which have come about as a result of experimental investigation. First, there is the "condition-reflex" theory which Pavlow has enunciated as a physiological explanation of the primary and secondary laws of association and which to the behaviorist explains most of the facts of learning. Second, there is the theory postulated by Thorndike involving the principles of exercise and effect. The third theory is that of the Gestalt psychologists, who regard learning as a development of insight thru what is to them the principle of "closure." This theory postulates a physiological disequilibrium which, when brought into contact with the stimulus field, results in insight. Solution of the problem immediately follows. However, tho a great deal of experimentation has been done, we possess little knowledge as to what actually happens in the nervous system when one learns. At best the explanations and descriptions which abound are mere theories. We really know very little concerning the basic causal factors.

The Problem

This discussion presents no new features but attempts to analyze the results of the learning test, known as the "Bronner-Healy Learning Z," which was constructed by Dr. William Healy and Augusta J. Bronner. Thru the analysis of the results of this test given to 196 college students, the following topics present themselves: First, individual differences as demonstrated by the range and deviations of the group from the central tendency, the mean; second, the relation between speed and accuracy; third, the difficulty inherent in each of the symbol combinations and an introspective report by some of the subjects as to what occurred in consciousness when the test was taken. These problems are pertinent to the content of the study.

Description of the Test

The Bronner-Healy Learning Z test is an association test, the materials of which are six rows of geometrical symbols, eighteen in each

row. The subject copies the appropriate number from the symbol on the key to be placed on the similar symbol of the first exposed row. One minute is given for copying and learning. The subject then folds down from sight both the key and the exposed row and then attempts, by looking at the symbols on the newly exposed row, to associate the correct number with each symbol. One minute is allowed for this exercise. The subject repeats the process of copying and learning, recalling and associating until three pairs of rows of eighteen symbols each have been attempted. The scores on the even rows are summated. The highest possible score is 54.

One hundred ninety-six college students took the test. After each student had finished, he was asked to write down an introspective report of how he learned the symbols and numbers. No suggestions were given with the request.

Results

The significant measures show the usual variation in performance. The maximum score was 54; the minimum score was 10; the median was 36.7; average was 35.4; and the average deviation was 8.1. The distribution compares favorably with the norms found by Brotemarkle with 2,130 cases. However, in the study herein reported the time for learning was shortened from 90 seconds to 60 seconds. The length of the range and the average deviation indicates that college students vary considerably in their ability to associate symbols and digits. Evidently, it is a much more difficult process for some than for others. What causal factors underlie this difficulty?

Accuracy and Speed

If the score of any individual on the test is taken to represent the speed with which he learns and the relation of the rights to the number of attempts, i.e., rights plus wrongs, to represent his accuracy, then the combination of these two scores would be a measure of his speed and accuracy. In general, there is a close relationship, considering the groups as a whole, between speed and accuracy, the correlation being .8914, probable error .009895 (Pearson Product-Moment Formula). If, however, we consider the quartiles of the two distributions, the number right denoting speed and the number attempted denoting accuracy, there is some overlapping. A count of this overlapping reveals these facts:

36 subjects, or 18 per cent, could be called fast, accurate learners.

19 subjects, or 9 per cent, were rapid but medium in accuracy.

79 subjects, or 35 per cent, were grouped around the median in both speed and accuracy.

22 subjects, or 11 per cent, were around the median in speed but below in accuracy.

40 subjects, or 20 per cent, might be considered slow and also inaccurate learners.

One student (judged by his many attempts compared with his inaccuracies, might be considered a fast but inaccurate learner. These results indicate that, while there is a close relationship between these two

factors (speed and accuracy) considering the entire group, there are also small groups of subjects within this large group who learn fast and are not so accurate, others who are accurate and slow, and still others who are slow and inaccurate, besides the fast and accurate learners. This knowledge should be of value in diagnosis in any group of learners. While accuracy and speed are probably closely correlated, there are instances of variations from the general rule.

The Relative Difficulty of Learning in Terms of the Eighteen Symbols to be Associated with the Proper Digits

This question concerns itself with the relative difficulty inherent in each symbol and its appropriate digit in the learning process. All symbols missed three times by the learner were tabulated and ranked in order of difficulty. The number of times a symbol was missed or omitted three times was taken as a measure of difficulty in learning the combination. Table I shows the rank and number missed three times of each of the 18 combinations. In order to check on the symbol-number combinations missed three times as a measure of difficulty in learning, a count was made of each symbol missed on 196 papers. Table I also shows the rank and number of each symbol missed of each combination. An inspection of this table reveals the following facts:

1. The first combination was scarcely missed.
2. The first nine or ten rankings, or about the first half of the distribution, of either table contains the more unfamiliar symbols which present seemingly less difficulty for the learner.
3. The latter half of the distribution contains the more familiar symbols which seem to be much more difficult for the learner.
4. The most difficult combination was Symbol Combination 17 (see Table I), a familiar symbol which is met many times by a college student in his school experiences. The question arises as to why this combination should be missed much more frequently than any other and why should the first, the more unfamiliar combination, be missed *twice* only. There are probably many reasons. Perhaps "familiarity breeds contempt," since few subjects indicated in their introspective reports on the reverse sides of the test sheets that they concentrated on the unusual combinations but left them to chance with the others. Primacy, one of the secondary laws of association, might account for the first response being almost always correct.

The Gestalt psychologist conceives of learning as a result of the principle of "closure" whereby the stimulus field and the neural mechanism are brought together by the process of insight. Experience and familiarity with certain symbols are probably contributory factors to conditioning but may not be necessarily important to the principle of closure. The more familiar symbols that presented less difficulty for the learner are simple and more or less within the experience of most college students. However, these symbols from the point of view of closure do not exhibit the completeness of configuration which characterizes the more complex figures. Learning seems to be largely a neural process. Hunter has shown this to be true when sensory cues were controlled by

TABLE I. RANK OF EACH SYMBOL COMBINATION MISSED AND A COMPARISON WITH THE RANK OF THE SAME SYMBOL COMBINATION MISSED THREE TIMES

Symbol Combination	Actual Number Missed		Number Missed Three Times	
	Rank	Number of Times Missed	Rank	Number of Times Missed Three Times
	1	2	1	0
	2	90	3.5	8
	3	125	6	17
	4	133	4.5	14
	5	134	3.5	8
	6	149	4.5	14
	7	168	7	18
	8	170	9.5	22
	9	186	9.5	22
	10	193	8	20
	11	200	11	26
	12	226	16	38
	13	227	13	28
	14	228	15	32
	15	231	14	28
	16	273	17	40
	17	302	12	27
	18	340	18	41

the double alteration tri-dimensional maze. Hunter's rats learned the maze without the aid of proprio-ceptive and sensory cues. He affirms, "their explanation requires the assumption of some symbolic or some central neural process." Proprio-ceptive and peripheral factors aid in the process but they do not tell the whole story. No organism can learn when the neural connecting system has been removed. While we know little or nothing of what really happens, in neural terms, evidently such items as figure and ground and closure are pertinent to association. Therefore the neural mechanism and the stimulus field come together when the stimulus field presents a more complete closure. Then learning results. Perhaps the different configurations on the closure principle presented neural difficulties. So insight, or learning, was of necessity blocked.

Introspective Reports

What do the introspective reports tell us as to the method of learning? Altho modern psychological procedure discounts introspective results, some questions can be answered only by this method. A random sampling of these reports is given here just as they were tabulated from the learning test. The speed and accuracy scores precede the report of the subject. It is difficult to classify these responses. Many devices were resorted to. Many types of learning were employed. The descriptive work one meets most often is that of "association." Evidently, students associated two things together in consciousness. The following are typical:

Speed-Accuracy

40–34 I think I memorized the first four by picture. Number 8 looked like a tombstone; number 10 had x's at each side; number 5 looked like a window; I don't know how I remembered the others.

38–34 I tried to associate the number with figures in that I noticed where the figure was placed and tried to remember the correct number for each space.

39–34 I associated images, that is, I memorized the models.

Several reported the use of association with visual imagery present; such as,

Speed-Accuracy

49–49 Some of them I learned by associating the symbol with number, for example, Symbol Combination 7, the symbol is an upside (inverted) 7. The Symbol Combination 6 I memorized by thinking of a V8 car and remembering the number was a 6 rather than an 8.

48–48 I pictured the symbols with the number inside as I studied them in my mind. Associated these symbols with other things (with which) I am acquainted.

40–39 Imagery—I see a picture of the key—while copying I kept visualizing.

Speed-Accuracy

32–29 I saw a vision of it; I remembered certain ones all the way through.

46–43 For me this test involved pure imagery. I could see the figures with the numbers in them or beside them in my mind. Of course it was hard the first time but the low row was easy for me to see. For the third and fifth rows I tried to look at the top row as little as I could and this helped me on the fourth and sixth rows.

A few employed motor aids, thus helping themselves by kinaesthetic imagery; as,

Speed-Accuracy

47–43 I touched the figure with my pencil and looked hard at it, and said the number to myself.

37–34 I learned these symbols by pronouncing the letters over and over.

35–28 In putting down numbers for the symbols I connected certain symbols with certain numbers as the test went on.

A few used devices or tricks both as an aid to association and as a means of recall. Here again, visual imagery was reported in many cases; as,

Speed-Accuracy

31–29 I identified some of the figures with life objects, for example, Symbol Combination 1 with first place on a race course. I associated the numbers with the figures themselves since the figure's shape resembled the number.
I remembered some by their position on the sheet.

39–33 By image. The symbol reminded me of the digit. Sometimes by re-looking at one I could remember the next time.

33–28 I remembered the 7 because it was upside down.

33–33 I placed the figure and number in my mind and then went across the row until I picked out a figure or number that corresponded.

45–43 I unconsciously associated each figure with something familiar to me, for example as Symbol Combination 10 with the Masonic pin, etc.; Symbol Combination 5 with a blackboard; Symbol Combination 13 with an egg; Symbol Combination 9 with equal marks.

Conclusions

The following conclusions are a result of the analysis of the Bronner-Healy Learning Z:

1. The significant measures of the distribution of test scores show a marked variability in performance. Evidently, qualitative differences of a special nature mark the learning process of individuals of college grade.

2. According to this test a high relationship exists between speed and accuracy for the group as a whole. An inspection, however, of the distribution reveals the diagnostic features of the test in that it shows small groups of individuals who are accurate and fast learners, accurate and slow learners, medium learners in accuracy and speed, and inaccurate and slow learners.

3. There is a qualitative aspect of the learning process which results from an inherent difficulty that seemingly resides in the symbol combination as it comes into contact with the neural process of the learner. This difficulty seems to be the same thruout the distribution in that the more familiar configurations present more difficulty to the learner than do the less familiar ones. This might be accounted for theoretically in many ways. The closure principle, whereby, in general, the completed figures are learned more easily, is postulated as a partial explanation. However, there are some exceptions to this.

4. The introspective reports indicate that many devices to aid the process of association were used. This would involve the conditioned-reflex theory of learning.

5. From many reports, visual imagery was used. It would seem that there are many kinds of visual imagery since the results of the neural contact of the individual with the stimulus field vary qualitatively for the individual and in terms of the types, shapes, and sizes of stimuli in the visual field.

6. Finally, as others have shown, learning is very complex. No theory explains all the facts. However, imagery, figure and ground, the principle of closure, and other neural phenomena should receive more study respecting the learning process.

Bibliography

Gillespie, F. R. and Brotemarkle, R. A., "Interpolated Revision of College Adult-Level Norms for Personnel Procedure," *Journal of Applied Psychology* 13:325-45, July-August, 1929.

Hunter, W. S., "The Sensory Control of the Maze Habit in the White Rat," *Journal of Genetic Psychology* 36:505-37, December, 1929.

Lashley, Karl Spencer, "Learning, I: Nervous Mechanisms in Learning," In *The Foundations of Experimental Psychology*, by C. A. Murchison, editor, pp. 524-63, The Clark University Press, Worcester, 1929.

Meumann, E., *The Psychology of Learning*, Chapter V, pp. 139-230, D. Appleton and Co., New York, 1913.

Munn, N. L., *An Introduction to Animal Psychology*, Chapters IV, V, VI, pp. 155-352, Houghton Mifflin Co., Boston, 1933.

Perrin, Klein, *Psychology; its methods and principles*, Henry Holt and Co., New York, 1932, 336 pp.

Sandiford, Peter, *Educational Psychology*, Chapter IX, pp. 167-82, Longmans, Green and Co., London, 1930.

Thorndike, E. L., *Human Learning*, The Century Co., New York, 1931, 206 pp.

Freshman English Testing Program at the Indiana State Teachers College

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ACCORDING to homiletic technique, I shall outline what I purpose in the following paper. First comes an account of Freshman English testing as it has developed at Indiana State Teachers College; second, some of the meanings of the data obtained; and third, a bit of moralizing.

It may be said, in beginning, that the point of view with respect to Freshman English (the term is employed in its usual sense) is—I am not ready to admit a low one, but let us say—a middle-ground one. For our students, English ability is one of the practical arts, not a fine art. Hardly one in a thousand has a shred of literary ambition. English is for the teacher a tool, her most used and most useful tool, and nothing more. I am aware that there are exceptions, and for them we thank Heaven, but the generalization stands.

Freshman English testing began in a rudimentary way in Teachers College about the year 1925. Previously, the practice of distributing sections of the class thruout the daily program had obtained. At that time two teachers succeeded in having sections scheduled for the same hour. Students were permitted to register for either section. At the first class meeting the students of the two sections were subjected to the Cross test.[1] The tests were scored, and at the second meeting students were shifted from and to each section according to their test scores, so that, at the end, one section comprised the better prepared, the other the more poorly prepared.

The experiment convinced the two instructors that the advantages far overbalanced the disadvantages. In consequence, by 1928, all entering freshmen on four-year courses, and by 1932 all entering freshmen were tested.

With the inauguration of the freshman registration day in the fall of 1928, the actual testing problems were for the most part solved; the heaviest of these were that of selecting some one hour in the day and finding a room large enough to accommodate all the entrants, and that of providing a sufficient time period in which to score the tests and to manipulate the data obtained.

The immediate and perhaps the more serviceable use made of the data is that of grouping the entrants into class sections each made up of students of approximately parallel preparation.[2]

[1] Cross, E. A., *The Cross English Test*, World Book Co., New York, 1924.

[2] An extensive list of uses may be found in: J. D. Heilman, *Report of the 1933-34 Testing Program of the Teachers College Personnel Association*. Colorado State Teachers College, Greeley, Colorado, February 17, 1934.

May I disgress a moment to explain that we do not regard the English test as an intelligence test, altho I have the statement of psychologists that an English test is a very good intelligence test, and furthermore the Dean's Office of Teachers College, which has more to do with student testing than any member of the faculty, has told me that the correlation between psychology tests or "intelligence" tests and English tests is closer than that between psychology tests and any other. Personal opinion is, of course, unreliable; but it may be added that the judgment of the instructors of English sections accords with what has just been said. By the English Department at Teachers College the English test is looked upon, first, as a measure of the acquired ability to write good English well, and, second, in a minor degree, as a measure of the ability to speak good English well.

To return, the process of making up sections is carried out in the following way:

The scores are arranged in descending order. Merely for convenience in handling and filing, the scores are transferred to individual cards. Approximately the upper 10 per cent of the group, that is to say, those who make scores above the 90-percentile score, are tentatively excused from the first quarter's work on condition that the work in the second quarter fulfills the promise of the test. Otherwise the student is held for further work. This practice has obtained now for two years, and to date no such student has had to be held for further work.

Now, the remaining cards are divided into proportional sections by counting off in order the number for each. The plan produces sections, each within itself, of comparatively narrow distribution or of quite closely parallel preparation. The section comprising those of lowest ability is called "English Zero," the interpretation of which is that the students spend the first quarter bringing up the training which they should have possessed on entering, that they get no record on the books, and that they must consume two quarters in earning their first English credit.

At the end of the first quarter the test is repeated. Consequently, for classification for the second quarter two kinds of evidence are available—the two test scores and the instructor's evaluation as shown by the grade mark for the first quarter. In view of these, students are replaced as indicated, but no very extensive shifting has seemed requisite, so that in general the classes go thru the two quarters with relatively little change in personnel.

To compensate for possible error, the policy is to regard the original allocation of students as not necessarily permanent. A conscientious effort is made, especially during the first few days of the quarter, to discover any misplacements; such students are at once moved to sections, either higher or lower, in which they promise to be able to work. Such readjustment has been seldom necessary, but the way remains open.

Some information as to the test used and the results obtained may be in place. As already indicated, the first test used was the Cross English Test. For the purpose of comparison, there follow in Column 2 of Table I quartile scores as determined for the Indiana State Teachers College students, and in Column 3 corresponding quartile scores as determined by the author.

TABLE I. TRAINING OF ENTERING FRESHMEN AT I. S. T. C. IN 1927 AS SHOWN BY A COMPARISON OF NORMS*

Percentile	I. S. T. C.	Author
90	153	160
75	143	152
50	133	142
25	120	131
10	111	121

*Cross, E. A., *Cross English Test, Manual of Directions* (revised), p. 6.

The evidence points quite definitely to inferior preparation on the part of Teachers College students as compared with those on whom the author based his determination. After a lapse of time, the same Cross test was used again in the fall of 1932, but I have not yet been able to get the data.

Then in 1928-29 and 1929-30, the *Iowa Placement Test, English Training*,[3] was determined on. Comparative results are shown in Table II.

TABLE II. TRAINING OF ENTERING FRESHMEN AT I. S. T. C. IN 1928 AS SHOWN BY THE COMPARISON OF NORMS*

Percentile	I. S. T. C.	Author
99	181	175.
90	135	145.1
80	119	129.2
70	106	117.4
60	95	107.4
50	86	97.7
40	73	87.7
30	62	77.8
20	51	67.3
10	34	53.4

**Manual of Directions*. Manuscript insert under date of June 1, 1932.

Again, Indiana State Teachers College students show to their disadvantage, and quite markedly so, the difference varying from 10 points at the higher level to nearly 20 points at the lower level. The report of Heilman, mentioned above, shows substantially the same condition. I am able to account to myself for this condition on what is for me a hypothesis, that technical and professional schools, and especially teacher-training institutions, draw students of less adequate English training than do liberal arts schools. The hypothesis may be false, and I hope it is. But, if I am right in assuming that, since E. A. Cross is a member of the faculty of a teachers college, his data probably came from a student body largely, if not wholly, made up of prospective teachers, I have no explanation of the poor showing made by our students as revealed in the first table.

[3] *Iowa Placement Examinations, Series ET1, Revised A and B*, Bureau of Educational Research and Service, Extension Division, State University of Iowa, Iowa City, Iowa. The English Training Series constructed by M. F. Carpenter and G. D. Stoddard, 1925, 1926.

At the opening of the school year in September, 1932, and again in 1933 we used the *Barrett-Ryan English Test.*[4] For the sake of comparison the same material as above is given for this test. Teachers College data were obtained in the fall of 1933.

TABLE III. TRAINING OF ENTERING FRESHMEN AT I. S. T. C. IN 1933 AS SHOWN BY A COMPARISON OF NORMS*

Percentile	I. S. T. C.	Author
99	133	134.8
90	124	118.7
80	119	111.2
70	112	105.7
60	108	100.8
50	104	96.5
40	100	92.3
30	95	87.9
20	92	83.
10	85	76.3
1	69	55.5

*Barrett-Ryan English Test, Manual of Directions, p. 4.

It is at once apparent that Indiana State Teachers College students made a better showing than did those whose data the authors used, the superiority ranging from 5 points at the 90-percentile level to 9 points at the 10-percentile level. Perhaps this relationship may account for any prejudice we feel favorable to the Barrett-Ryan Test.

I think I may add one more table for a reason which it will itself reveal. Both columns of data are from Indiana State Teachers College, the first showing results in 1932, the second in 1933.

TABLE IV. TRAINING OF ENTERING FRESHMEN AT I. S. T. C. IN 1932 AND IN 1933

Percentile	I. S. T. C. 1932	I. S. T. C. 1933
99	136	133
90	125	124
80	116	119
70	111	112
60	106	108
50	103	104
40	99	100
30	96	95
20	92	92
10	84	85
1	63	69

[4] Barrett, E. R., Ryan, Teresa M., and Wood, E. R., *Barrett-Ryan English Test*, Bureau of Educational Measurements and Standards, Kansas State Teachers College, Emporia, Kansas, 1929.

The same test, the Barrett-Ryan Test, was used in both years. The significance is that there appears to be a slight upward trend, or that Teachers College students came in 1933 with a slightly better preparation than in 1932. There is ground for a bit of optimism in this.

And now to the morals. I am at pains to be conservative; I wish to avoid unjustified conclusions. As I think over the ten years during which English placement testing has at least budded—I say it timidly and hesitatingly—I think some progress is apparent. I admit I have no adequate proof, but I have submitted a little evidence. What I mean is that at present very widespread employment of English testing has helped to send the word back home that the elementary English training did not train; that more time and attention must be given to capitals and commas, and spelling and verb forms; and that Comenius was wise —we learn to do by doing, and we learn to write by writing, as we learn to speak by speaking.

Let us make three inferences, without pretense of completeness or profundity:

1. That instruction below the college does not take root, does not show results.

2. That an indefinite proportion of high school graduates who enter college do so inadvisedly.

3. That the "get-by" attitude of mind of the pupil is the biggest obstruction in the way of advancement.

I shall try to expand these somewhat, and the last shall be first.

3. About the most difficult position from which to rout the student is phrased in "getting by." The student apparently says to himself frequently and occasionally proclaims from the house top:

"I c'n order me soup at a beanery; I c'n buy me a lid at a toggery; I c'n hock my fiddle at Unc's; in the name o' Jiggs, ain't that enough?"

"And I seyde his opinioun was good.
What sholde he studie, and made himselven wood, . . ."

Only the other day a student wrote for me, "Why should a doctor study English, when he might study cancer?" And when labor says, "When you have done enough to get by, what's the use to do more?" who is to prevent the student from absorbing the attitude? But enough.

"I tell you that which you yourselves do know."

2. That some part of those who proceed to college do so inadvisedly is at present asserted by most, if not all, who are informed. I quote from the minutes of a meeting of the advisory committee to the State Department of Public Instruction held March 23, 1934.

"Superintendent McMurray then addressed the members of the committee setting forth the following suggestions for consideration and investigation: . . . 'III. The number of certificated teachers now unemployed in Indiana is exceedingly large. Perhaps efforts should be made to bring about greater selectivity in the preparation of teachers. We should stop the practice of training teachers merely because they have the money to buy the training.'"[8]

[8] From a copy of the minutes handed me by President Ralph N. Tirey.

State law restricts selection by state-supported institutions, and the need of money and the ambition for bigness have the same consequence for other institutions.

1. These seem to be the conditions; perhaps they are as they should be; I am not prepared to support the negative. Probably the outstanding need at present is more effective instruction both below the college and in the college. Since I have just admitted that instruction in college may be subject to adverse criticism, and since this paper deals with entering freshmen who have, therefore, had no college instruction, I feel free to confine myself to instruction up to college entrance. And I shall attempt to clarify the point by marshaling obstacles that stand in the way.

(1) The heterogeneous origin and the consequent heterogeneous language-character of our population have deadened our ears to the spoken word, and our sensibility to the written word. We have grown crassly indifferent to qualities of language. But this is not a fault of the grade-school or high-school teacher.

(2) The competition of literature with composition and of interpretive study with constructive study, the preference for the consumer's point of view rather than the producer's has minimized the efficiency of composition teaching. Our grandparents studied grammar, *Harvey's Grammar;* then in our earlier years the pendulum reversed its swing, and we and our children were saturated with classics, in the belief that from them we would absorb writing skill. But the results did not carry over, and so, twenty or fewer years ago we swung with the pendulum backward again; we began to put more and more emphasis upon expression. But we are conservative, and changes, I will not say reforms, circle outward slowly. The result is that an undue proportion of time and effort is still claimed by the courses in literature. Anyone can account for the inertia; literature teaching is less burdensome, involves less of drudgery than does composition teaching. And that is a second obstacle.

(3) Another obstacle is the notion that anybody can teach English, that is, anybody who can read and speak it. Whether this statement is fair to general opinion may be open to question. I shall leave the answer to you.

(4) Again my observation leads me to the belief that there exists a not universal, but rather wide-spread, tendency to use the high-school English position as a means of pensioning obsolescent teachers of other subjects who by length of service and faithfulness have established a claim on school funds, have earned or are conceded a kind of tenure. No one can in charity object to such claims, but parents should oppose saddling the burden upon the English department.

(5) The last of the obstacles that I shall refer to is the colleges themselves. They have long restricted composition wholly or largely to the freshman year, and allotted to it a small proportion of time. But since 1923 or thereabouts the colleges have been able to dodge the responsibility. The state license regulations provide a time proportion of nine to fifteen (twenty-four semester-hours in all, including six in com-

position and three in speech) that is, nine semester-hours in constructive English to fifteen hours in literature. Such proportion prescribed by the state and carried out by the colleges is regarded as authoritative, and enforces itself upon the high school. The proportion is not a fair one, and it increases the load of the composition teacher; it obligates her to present with equal adequacy the more important phase of English in the less time allowance. May I say that, in my opinion, when we have found time for the adequate teaching of speech and composition, even, if necessary, at the cost of literature, we shall have made significant progress.

May I now remind you that I have not, so far, laid any part of the responsibility or blame upon the head of the teacher herself; and in that is reflected my judgment. The English teacher is as fallible as any of the sons of men, but let her know what is wanted and give her time and means, and I prophecy that we shall receive substantially what we ask for.

Heredity and Environment in the Determination of Intelligence

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INHERITANCE is carried thru certain substances in germ cells—chromosomes. Within chromosomes are minute substances called genes. The earlier conception was that a particular characteristic of an adult organism—say color of eyes or hair, or shape of nose, or intelligence, or temperament—any physical or mental characteristic—was carried by a particular gene. According to this conception of the matter, it may be thought that all the characteristics of adults are transmitted in a fixed and absolute manner, with no possibility of modification thru education or other environmental influence. If I understand the modern biological conception, this is an incorrect inference. Any characteristic you please, such as color of eyes, is determined not by one gene but by a great number of them, perhaps 50. The same thing would be true of intelligence or of any other mental characteristic. That is one point.

The second point is this. The fact that there are certain genes in the germ cell does not determine in a fixed manner the characteristics which the adult will manifest. The development of the organism is due to the influences of the environment, and the genes furnish only the potentiality. They do not absolutely determine the characteristics that the person will manifest as an adult. This has been proved in the case of lower animals by direct experimentation. It has been found possible to modify very greatly the characteristics of the organism by applying difference in heat, moisture, electrical stimulation, etc., to the germ cell and the embryo in its earlier stages. The conception which is derived from these facts regarding the relation between nature and nurture is that our potentialities are contained in the germ cell and in the genes. We can never develop any characteristic not contained in these potentialities, but these germ cells contain a vast number of potentialities which may or may not be realized. Whether they will be realized or not depends upon the influences brought to bear upon the organism during its development. In other words, it becomes a matter for experimentation and for observation as to how far these possibilities that are contained within the organism are realized and in what direction and to what degree they are modified by the influences of the environment. We cannot predict from any knowledge that we have of biology how far these modifications are possible. Therefore, it becomes necessary to experiment—to study the development of the organism under different conditions to see how far modifications can be brought about. It is a question for experimentation and not a question for predetermination on any biological grounds.

Since the introduction of intelligence tests, it has been believed by many people that intelligence, or that which is measured by the in-

telligence tests, is an innate capacity and that it cannot be modified by education. Now this, after all, is not a demonstrated fact. It is simply an assumption. It is suggested, perhaps, by some of the earlier findings of intelligence tests, particularly regarding the constancy of the intelligence quotient, that a child's I.Q. remains substantially the same thruout his life, or at least thruout that portion of his life which has customarily been followed. As a matter of fact, we have not until recently followed many individual children over more than two or three years. Therefore, we have not been able to say whether the I.Q. is constant over a long period of time or not. Since we have been making repeated tests over longer periods, we have found that there is a good deal more change than we earlier thought existed. But even if we had found that there was not much change over longer periods of time, the question would not be settled unless we followed the children under radical changes in environment; that is, if the child's I.Q. remains constant year by year, that may be the effect of environment, provided the environment has been constant. Only if the environment has changed would it be an evidence that it is determined by heredity rather than by the environment.

There is one other preliminary matter that I might mention and that is the nature of another type of evidence which has sometimes been cited on this question of nature and nurture. This type of evidence consists of the comparisons between groups of persons—what I commonly call group comparisons. Let me give you just two or three illustrations of these group comparisons. One of them was made shortly after the World War by means of the results of the Army Intelligence Tests. When the scores of men in the different states of the Union were tabulated separately, it was found that there was a large difference in the average scores of men of the different states. In general, the southern states yielded much lower scores than the northern states. The greatest contrast was between Mississippi and Oregon. The average score for Mississippi was 36, if I recall correctly, and for Oregon it was 72. In other words, the Oregon recruits made a score which is twice as high as that of the Mississippi recruits.

Now, the interpretation of this fact, made by those who believe in heredity, is that the native stock in Mississippi is deficient and the native stock in Oregon is superior, and it is superior by that amount. Of course, those who believe in the effect of education have an obvious retort to that interpretation on the ground that the school system in Oregon is very much more highly developed than the school system in Mississippi. In fact, if you take the Ayres rating of the school systems in the various states and correlate them with the average scores on the intelligence tests, the correlation is somewhere in the 70's. Now, you can interpret that correspondence in either of two ways. Of course, it is well known that you cannot determine causal relations merely by correlation. Some may believe that the correlation may de due to the fact that persons of native superiority will develop a better school system, whereas those who believe in education will interpret it to mean that the differences in intelligence are due to differences in education.

There are a great number of comparisons of the same sort which make possible either interpretation. For example, there is a difference in the tested intelligence of persons in different occupations. Is it because the occupations attract to them persons of different native intelligence, or is it because the preparation for these vocations and the activities of the vocations themselves have an influence upon a person's intelligence? The mere fact of correspondence gives no answer to the problem.

I will not go into other comparisons, but will simply mention some of those that can be made in a similar fashion and interpreted in this double way. The difference in the intelligence of immigrants who come into the United States in different periods can be interpreted in either of the two ways. The difference in the intelligence of city dwellers and country dwellers can be interpreted in the same ways. Even the difference in the intelligence of persons who have had different amounts of education can be interpreted in the two ways. That is, those who believe in the potency of heredity say that some individuals remain longer in school because they are natively brighter and that their superiority of intelligence is not due to their more prolonged education but simply to their native capacity. And, of course, the believer in education interprets the difference as the result of the difference in education.

The source of the ambiguity in all of these cases, or one source at least of this ambiguity, is the fact that there is a correlation between the two factors. Take, as an illustration, another comparison—the comparison between the intelligence of parents and that of children. Usually the correlation, which runs about .50, is interpreted as due to heredity. This is a natural interpretation. And yet, as we know, superior parents generally give their children superior surroundings—better home advantages, better schools, and longer periods of schooling. Therefore there is a correlation between superior heredity and superior environment. That being the case, it is impossible to separate these two factors and to say how much of one's intelligence is due to one or how much to another of these components. Therefore it is necessary for us to find some method of distinguishing between or separating the two factors of environment and heredity in order to tell how each one influences or determines intelligence. We have attempted to do that by the study of twins.

In our first study we compared the two groups of twins, identical and fraternal, by means of correlations. We sought to find out whether the resemblances between them are due more to heredity or to environment. You are probably familiar with the difference between these two types of twins. Fraternal twins have no closer relation biologically than brothers and sisters. They happen to be born together, but they come from separate ova separately fertilized. Identical twins come from a single ovum which divides and develops into two individuals that are halves of the same individual, biologically or genetically considered. Therefore, the heredity of identical twins is exactly the same, whereas the heredity of fraternal twins is the same to the extent of 50 per cent. It ought, then, to be possible—at least it seems as tho it might be

possible—by means of statistical comparison to tell how far heredity determines intelligence in the case of these two groups. We secured 50 pairs of fraternal and 50 pairs of identical twins. We took only fraternal twins of the same sex because identical twins are of necessity always of the same sex. We gave these 100 pairs of identical and fraternal twins a battery of tests and then worked out the correlations between pairs on all of these tests. We gave them a number of physical tests, a number of intelligence tests, an educational test, a test of nervous stability, the Woodworth-Matthews personal data sheet, and a test of motor dexterity. We thought from a comparison of these correlations we might be able to draw some conclusion regarding the potency of heredity as determining the resemblances and some inferences concerning environment. The inference from these comparisons is rather indirect.

Let me give you an illustration or two to bring out a line of reasoning which may be followed in interpreting these results. Take one physical characteristic which is probably not affected at all by the environment—the number of friction ridges on the fingers. You know about the lines on fingers and on the palms which are used in the finger and palm print methods devised by Bertillon and used in criminal records. These finger ridges are also of a good deal of importance in biological investigations. The number and pattern of these ridges differ in different persons. In identical twins the patterns and the number of ridges are very similar. In fraternal twins and in brothers and sisters or in parents and children there is more similarity than between people picked at random but not as much as in the case of identical twins. If you measure or express the degree of resemblance in a correlation you will find that the total finger ridges on both hands of identical twins correlate to the extent of .95. That means that there is as much agreement in the hands of two identical twins as there is between the right hand and left hand of the same individual, almost an identity. In the case of fraternal twins the resemblance is represented by a correlation of .46, just about the resemblance that we usually find in brothers and sisters. In accurately measurable traits, the difference between these two correlations is .49. That is the point that I want to stress.

The difference between the correlation for fraternal twins and the correlation for identical twins will be a measure of the difference in heredity between these two types of twins because the difference between them is due to the fact that there is a closer genetic relation between identical than between fraternal twins. Let us compare this difference with that in the case of some of the other physical and mental traits. If we take standing height we find that the difference is not so great. The correlation for identical twins is almost as high, being .93, but for fraternal twins it is .65. Fraternal twins resemble each other more in height than in finger ridges. We interpret this as due to the fact that similarity in the environment of these fraternal twins has increased the resemblance between them, has made the resemblance between them closer than it would have been merely from genetic causes. The same thing is true of weight. The difference between the correlations in weight is only .29.

I will not give you other physical measures, but there you have a contrast between a characteristic which cannot conceivably be affected by environment and in which there is a marked contrast between the identical and fraternal twins and other characteristics in which the contrast is much less. In the case of intelligence, the contrast is about the same as in the case of height and weight and is much less than in the case of finger ridges. The correlation of Binet I.Q. is .88 for identical twins and .63 for fraternal twins, a difference of 25 points. Fraternal twins are more alike than we would expect them to be from the degree of genetic resemblance. Our interpretation is that the similarity in their environment has increased the similarity in intelligence which was due to heredity.

When we come to the Stanford Achievement Test we find that the difference is still less, as one would expect; the Stanford Achievement Test, being an education test, might be naturally supposed to be affected more by environment than the other characteristics. In the case of word meanings, the difference between identical and fraternal twins is about as much as in intelligence, 30 points. In arithmetic computation the difference is 4 points—identical, .73; fraternal, .69. The fraternal twins resemble each other almost as much in arithmetic computation as the identical twins. The difference in nature study and science is 12; in history, 15; and in spelling, 14. In the total educational age, which is the combination of all these educational tests, there is a difference of 19 points. The conclusion, then, is that in educational achievement the resemblance in the environment of fraternal twins has made them more alike than they would have been solely because of the resemblance in heredity.

Dr. Holzinger, who is the statistician who took part in this study, has devised a statistical method for expressing the ratio between the heredity and environment component in these resemblances by a single number. I won't attempt to give you the formula by which he has derived this ratio, but I will give you the result of his calculation in the case of the Binet mental age. Heredity accounts, according to his calculation, for 65 per cent of the differences we find among people. Thirty-five per cent, then, would be due to environment and education. In the Binet I.Q. it is about the same, 68 per cent. On the Stanford Achievement Test it is 64 per cent. In other words, according to this calculation, about two-thirds of the difference is due to heredity and about one-third is due to environment. Some of the assumptions underlying his procedure may not be accepted by everybody. I am not saying that it is a thoroly substantiated formula, but I am saying it is an attempt, and at least an attempt worthy of consideration, to express the relation between these two factors in this particular case.

A much more direct means of getting at this whole problem is to find pairs of persons who are identical in heredity but who have had a different environment. When you have similar heredity and similar environment, an intricate statistical procedure is necessary to try to distinguish these two factors, but if you can keep one of them constant and vary the other one, then you will get a direct experimental measure rather than a roundabout statistical calculation. Our ideal is, of course,

to simplify the conditions so that one factor can be made constant and the other factor can be varied. You cannot very well keep the environment factor constant and vary the heredity. This is too difficult. But we have one type of case in which the opposite is done—the heredity is constant and the environment is varied. When identical twins are brought up together that difference does not exist, but in the few cases in which identical twins are separated in infancy, and have different environments and different homes, we have our ideal experimental condition. Before our investigation one such case had been reported by Dr. Mueller of the University of Texas.

Nineteen pairs of twins met these conditions—i.e., nineteen pairs of identical twins were found who had been separated in infancy and brought up thruout most of their lives in different homes. However, not all of these pairs of twins are ideal subjects for the investigation because of the fact that, while they have been brought up in different homes, the homes have not always varied very much from each other. While they were actually different, they were similar in character. In a good many cases the amount of education received by each of these twins is similar; the kind of schools attended are similar; and perhaps the occupational experience is somewhat similar. Therefore, not all of these cases illustrate a marked difference in environment. In some cases, however, the difference is marked.

We have given these nineteen pairs of twins a rather lengthy battery of tests—four or five intelligence tests, the Stanford Achievement Test, and two or three tests of will temperament, emotion, or personality. We have then calculated the differences between them and compared these differences with the differences found between identical twins reared together and fraternal twins reared together. Let me first give you these averages and then I will comment on a few of the more striking cases. In the case of the Stanford Binet I.Q., the average difference between identical twins brought up together is 5.9, and the average difference between fraternal twins brought up together is 9.9. The difference between these two averages is due mainly to the closer inheritance of the identical twins; that is, in both cases they are brought up together and therefore have similar environment. In the case of identical twins the heredity is the same, whereas in the case of fraternal twins it is only 50 per cent the same. In the case of all of our identical twins brought up apart, in some cases in widely different environments and in some cases in similar environments, the average difference in I.Q. is 8.2—nearer fraternal twins than identical twins. In other words, this difference in environment due to separation in infancy has increased the difference in intelligence by a marked amount.

Now, take two or three other measures. The average difference of the Otis I.Q. of the identical twins reared together as determined by the Otis Self-Administering Test was 4.5, a little closer than the Binet I.Q. The difference in the Otis I.Q. of fraternal twins was 9.3, or about the same as the difference in Binet I.Q. The mean difference of identical twins reared apart is 8.2, the same as in the case of the Stanford Binet. Identical twins reared apart are almost as different as are fraternal twins reared together. In the Stanford Achievement Test the

contrast is very much more striking. The average difference of identical twins reared together was 6.4; of fraternal twins, 11.6; and of identical twins reared apart, 16.3. In other words, identical twins reared apart are much less alike than are fraternal twins who are brought up in the same home. A difference in environment produces more difference in educational attainment than does a difference in heredity between fraternal twins.

We also gave a non-language test, a test which was designed for the purpose of measuring inherent differences entirely separate from cultural influences, called the International Test, devised by Professor Dodd at Princeton University. We have no norms, but the difference between identical twins and fraternal twins brought up together was 23.6 points, as measured by this International Test.

In order to get a little more complete statistical measure of the relation between difference in environment and difference in these various measures, we took records that we had of the home environment and education of these identical twins separated in infancy, and four of us rated these differences. We rated their environments in terms of amount of difference—those having the most difference rated 10, those with the least difference 1. In order that we might compare that difference with the difference found in various tests, we rated them in educational and in social environment separately. I will give you only the difference for educational environment.

The correlation between difference in Binet I.Q. and in educational environment was .79. In other words, those brought up under most widely different environments differed most widely in Binet I.Q. The correspondence between differences in environment and differences in intelligence as measured by the Otis I.Q. was not so high—.55. The correlation on the International Test was slightly lower—.46. On the American Council Test, a test devised for college students, the correlation was .57. On the Stanford Achievement Test it was .91. In other words, we have correlations varying from .46 to .91 between the differences in environment on the one hand and the differences in education and achievement on the other hand. That means that those who were brought up under similar environments were similar, and those who were brought up under widely different environments were different, and their difference corresponded rather closely to the difference in environment.

I want to mention two examples because they are a little more concrete and a little more striking than these general statistical measures. The first of these are two sisters who were at the time we tested them about 35 years of age. They were separated in infancy and had been given very widely different amounts of education. One of them went thru only the second grade in formal school and the other went thru college and became a teacher. The first one, in spite of her limited education, had worked up and become a proof-reader in a printing office. Therefore, she displayed energy and native intelligence. It seemed to us after conversation with them that this sister had really pretty largely overcome this great difference in the amount of schooling. But when we tested them we found that the difference showed itself.

There was a Stanford Binet difference of almost four years in their mental age—a difference of 24 points in I.Q. Now, most psychologists will tell you that perhaps the environment can produce a difference of 10 points or in extreme cases 15 points. They would not ordinarily credit the idea that you can make a difference of 24 points in I.Q. merely by difference in education. On the Stanford Achievement Test there was a difference of 68; on the Thurstone Psychological Examination a difference of 88; on the International Test, a difference of 66 points; and on the Woodworth-Matthews Test of Psycho-Neurotic Disposition, a difference of 0. The temperaments of these identical twins apparently were not affected by differences in education, in so far as this test is a good measure, but their intelligence as measured by intelligence tests and their achievement differed greatly. When you consider that 20 points is enough to separate the lowest fifth from the highest fifth of the general population, then a difference of 24 points in I.Q. becomes one of great magnitude.

The other pair that I want to mention are brothers who came from Tennessee. They were typical mountaineers. One of them was brought up in a good, fair-sized town, by one set of grandparents; the other was brought up not very far away but rather completely separated from his brother thru most of his life by the other grandparents. Apparently the homes of these two pairs of grandparents were very widely different because the first young man, 29 years of age when we tested him less than a year ago, had had an occupation of a fairly high grade ever since he reached manhood. He had been steadily occupied in work which corresponds to that of a skilled mechanic. The other one had only had occasional work thruout his life. He floated around from one place to another. He had had less than an eighth grade education, in rural schools having short terms. He had never progressed into high school. His brother had graduated from high school. We had then another rather wide contrast, altho there was a general similarity in the cultural background. The difference in Stanford Binet mental age of these two young men was 36 months; that is, three years. The difference in their Binet I.Q. was 19 points; in Otis I.Q., 20 points; in Stanford Achievement Test, 35 months; and on the International Test, 52 points. But again, on the Woodworth-Matthews Test, a test of temperament, the difference was only 6 points, comparatively small.

Now, these facts seem to us to indicate that a wide difference in environment, education, home environment, and general social environment will produce a marked difference in intellectual ability. Of course, you may say that these intelligence tests do not measure capacity. But if we should say they don't measure native capacity, that would beg the question. They come as near measuring general intellectual ability as any measure we have been able to work out up to the present time. Therefore, I think we are justified in saying that one's general intellectual ability, one's ability to perform intellectual tasks of a general character, is affected to a very large extent by the difference in one's education and in one's general environment. I am not prepared to say that that difference is as great as the difference in heredity. Perhaps it accounts for about a quarter or a third of the difference. But even if

it only accounts for a quarter of the difference, that is large enough to be of a great deal of importance because, you see, we cannot change the child's heredity but we can change his environment. Probably at some future time we shall be able to control heredity in the long run by eugenics—I am not prepared to say whether we shall or not, but the difficulties in the way are enormous. One factor under our control is the education and environment of the child. If the change of environment will make a marked change in his achievement, even if it is only a third or quarter of his total achievement, it is certainly large enough to be of enormous importance.

The results, therefore, seem to me to give us ground for a greater faith in the potency of education than the more extreme doctrines of heredity have given us in the past. They indicate to us not only that differences between children may be modified to a great extent by differences in environment, but also that, if we could raise the general level of education of the whole community, we would by so doing raise the level of intellectual attainments. I am not so much interested in differences among children, except in that these differences give us a measure of the difference which may be affected in general by lifting the level of the environment. It seems to me that these facts warrant us in the belief that if we can raise the level of general education, by so doing we will not only give the child more information and more specific schooling, but will also give him a greater capacity to deal with general intellectual tasks and problems.

Pupil Ratings of Student Teachers

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IN THE April (1933) issue of *Educational Administration and Supervision* Mr. Roy C. Bryan's excellent summary[1] of the status of student ratings of teachers presents the principal arguments for and against such ratings, certain important statistical findings concerning them, a statement of the chief unsolved problems relating to the student rating of teachers, and a very complete bibliography of recent articles dealing with the subject. During the past few years the author has been doing a little experimenting along this line, which, tho not as extensive as one might wish, may supply something in the way of confirmation of tendencies revealed by Mr. Bryan's summary and perhaps enough divergence from it to be a stimulus to further investigation. This work may be thought of as being divided into four smaller studies.

Results of the First Study

The data for the first study were collected during the school-year 1930-31 from the pupils of 21 student teachers who were under the direction of the author. These teachers taught for the most part in the Greencastle (Indiana) schools. A few of them worked in some of the outlying Putnam County schools. The classes involved ranged in size from 8 to 40 pupils. Near the end of the student-teaching period, which consisted of 54 class periods, the student teacher was asked to leave the room and, with the critic teacher in charge in each case, the pupils were requested to rate the student teacher on the basis of the following:

Pupil Rating of Teacher Instructions

You are being asked to rate your teacher in the following manner: Below is a list of seven abilities which are very desirable in teachers and an eighth item which is intended to reveal how well you like this teacher. You should not let your like or dislike for the teacher influence the way you mark the other items, nor should you let the way you mark any one of the other seven items influence the way you mark any other item.

In front of each ability place the number which best describes your estimate of this teacher with respect to this ability. The following scale is your guide as to how to do this:

1. As poor as any teacher could be in the ability being rated.
2. A little better than the poorest.
3. Not quite as good as the average.
4. Average.
5. A little better than the average.
6. Not quite as good as the best.
7. As good as any teacher is ever likely to be.

[1] Bryan, Roy C., "A Study of Student Ratings of College and Secondary-School Teachers," *Educational Administration and Supervision* 19:290-306, April, 1933.

An illustration of a paper with the actual scores as given by a pupil may be found below:

Abilities

3 1. Ability to interest you in school work.
1 2. Ability to interest you in activities outside of your school work.
5 3. Ability to get you to do your own thinking.
2 4. Ability to make you want to complete whatever you start.
3 5. Ability to explain things clearly.
5 6. Ability to keep good classroom order.
1 7. Ability to make you want to make others happy.
2 8. How well do you like this teacher?

The coefficients of correlation computed by using chance halves in each of the 21 pupil groups are given in Table I.

TABLE I. COEFFICIENTS OF CORRELATION OF SCORES COMPUTED BY USING THE AVERAGES OF 21 PUPIL GROUPS, RANGING IN SIZE FROM 8 TO 40 PUPILS, RATING THEIR STUDENT TEACHERS ON 8 ITEMS OF A SCALE FOR PUPIL RATING OF TEACHERS

Item	r
1. Ability to interest you in school work	.67 ± .08
2. Ability to interest you in activities outside of school work	.88 ± .03
3. Ability to get you to do your own thinking	.50 ± .12
4. Ability to make you want to complete whatever you start	.69 ± .08
5. Ability to explain things clearly	.76 ± .06
6. Ability to keep good classroom order	.89 ± .03
7. Ability to cause you to want to make others happy	.74 ± .07
8. How well do you like this teacher?	.70 ± .08
9. Average of the first seven items	.91 ± .03

The intercorrelations among the items rated are given in Table II.

TABLE II. INTERCORRELATIONS AMONG THE ITEMS OF A SCALE FOR THE RATING OF TEACHERS. RATINGS ARE AVERAGES OF 21 GROUPS

Item	1	2	3	4	5	6	7	8	9
1		.62	.79	.78	.67	.59	.60	.62	
2			.21	.50	.45	.35	.46	.43	
3				.42	.77	.55	.63	.57	
4					.40	.48	.62	.46	
5						.46	.46	.62	
6							.50	.24	
7								.12	
8									.69

Results of the Second Study

The second study was similar to the first. It was made during the school year 1931-32 and was based upon results obtained from ratings on 30 student teachers under the author's general supervision. As before, these teachers taught for the most part in the Greencastle (Indiana) schools with a few scattered in some outlying Putnam County schools. The classes involved ranged in size from 10 to 42. The ratings were made near the end of the student-teaching period and the pupils were instructed to make anonymous ratings. The Purdue Rating Scale for Instructors was used in order to see whether or not it would give satisfactory results when used with high school pupils and whether these results would be relatively more satisfactory than those obtained the year before by the use of the author's rating scale.

The results of computing the coefficients of correlation between the scores obtained from chance halves of the pupil groups are shown in Table III.

TABLE III. COEFFICIENTS OF CORRELATION OF SCORES, COMPUTED BY USING THE AVERAGES OF CHANCE HALVES OF 30 PUPIL GROUPS, RANGING IN SIZE FROM 10 TO 42 PUPILS, RATING THEIR STUDENT TEACHERS ON THE ITEMS OF THE PURDUE RATING SCALE FOR INSTRUCTORS

Items of Purdue Scale	r
1. Interest in subject	.64 ± .07
2. Sympathetic attitude toward students	.81 ± .04
3. Fairness in grading	.58 ± .08
4. Liberal and progressive attitude	.56 ± .09
5. Presentation of subject-matter	.67 ± .07
6. Sense of proportion and humor	.69 ± .07
7. Self-reliance and confidence	.92 ± .02
8. Personal peculiarities	.77 ± .05
9. Personal appearance	.61 ± .08
10. Stimulating intellectual curiosity	.70 ± .06
11. Average of first ten items	.84 ± .04

The intercorrelations among the items of the Purdue scale are given in Table IV.

TABLE IV. INTERCORRELATIONS AMONG THE ITEMS OF THE PURDUE RATING SCALE. RATINGS ARE AVERAGES OF 30 GROUPS

Item	1	2	3	4	5	6	7	8	9	10	11
1		.75	.68	.83	.75	.70	.71	.76	.19	.78	.85
2			.86	.76	.84	.90	.73	.81	.51	.83	.93
3				.67	.73	.82	.69	.88	.49	.74	.86
4					.76	.84	.83	.80	.63	.79	.88
5						.88	.89	.80	.80	.55	.88
6							.76	.66	.75	.90	.89
7								.74	.74	.77	.87
8									.73	.71	.90
9										.67	.70
10											.91

In this study a comparison was also made between teacher and pupil ratings. Each critic teacher rated his student teacher. Teaching schedules were also arranged so that critic teachers were able to observe the student teachers of other teachers. By this method it was possible to secure from two to four teacher ratings upon each student teacher. The coefficients of correlation were computed between the pupil averages and the teacher averages, the results of which are shown in Table V.

TABLE V. COEFFICIENTS OF CORRELATION BETWEEN THE MEANS OF THE RATINGS OF PUPIL GROUPS RANGING IN SIZE FROM 10 TO 42 PUPILS AND THE MEANS OF THE RATINGS OF FROM 2 TO 4 CRITIC TEACHERS ON EACH OF 30 TEACHERS

Items of the Purdue Scale	r
1. Interest in subject	.15 ± .12
2. Sympathetic attitude toward students	.11 ± .12
3. Fairness in grading	−.50 ± .09
4. Liberal and progressive attitude	−.26 ± .11
5. Presentation of subject-matter	.47 ± .10
6. Sense of proportion and humor	.01 ± .15
7. Self-reliance and confidence	.03 ± .11
8. Personal peculiarities	.20 ± .12
9. Personal appearance	.03 ± .11
10. Stimulating intellectual curiosity	−.23 ± .12
11. Final averages	−.05 ± .12

Results of Third Study

During the school year 1932-33 the author carried on another investigation with the view to getting some light on the problem of the effect of marks upon pupil ratings. Nine student teachers were selected because it was felt that they constituted a rather representative group. In the case of these nine student teachers their pupils were asked to rate them without signing the rating sheets. It was necessary at this point to resort to a subterfuge. Tho the pupils thought they were making anonymous ratings, as a matter of fact the blanks were marked so that we really knew who made each rating.

Due to the fact that the two previous studies had shown considerable halo effect, it was decided to ask the pupils merely for a general rating on the basis of the seven-point scale used in the first study. The instructions to the pupils were as follows:

How good do you think this teacher is? Keeping in mind the list of traits on the board, give the teacher a general rating using the scale of values indicated below. Do not sign your name to the rating slip.

Scale of Value for Rating Student Teachers

1. As poor as any teacher ever is
2. A little better than the poorest
3. Not quite as good as the average
4. Average
5. A little better than the average
6. Not quite as good as the best
7. As good as anyone ever is

In order to focus the attention of the pupils upon the qualities of a good teacher the following list of traits was written on the blackboard as representing the characteristics of such a teacher.

Characteristics of a Good Teacher

1. Ability to get another's point of view, imaginatively to put himself in the other's place
2. Judgment, foresight with respect to the everyday affairs of life
3. Responsibility, dependability
4. Resourcefulness
5. Open-mindedness, willingness, and eagerness to face facts
6. Diversity of interests, eagerness to learn
7. Sincerity, straight-forwardness
8. Forcefulness, dynamic quality
9. Keenness of reasoning power
10. Self-control
11. Good presence; quality of being pleasant to meet
12. Power of self-criticism; ability to see his own weakness

Before the ratings were made the critic teacher and pupils discussed this list together with the view to coming to a common understanding concerning the meaning of its various items.

The ratings thus secured were correlated first with the averages of marks made by each pupil during the student-teaching period (student teachers are responsible for marks given during their period of student teaching); and second, with a differential between these marks and the averages made by each pupil during his junior-senior high school course up to, but not including, the semester in which the rating

was made, in the subject-matter field in which the student teacher was teaching. These differentials were computed as follows: Suppose pupil X was taking the first semester of botany. He probably had not had botany before but he had had science in the form of general science, so his average mark in this subject was taken as the base from which to compute the differential. If the pupil had had more than one science course previously, the average of all his marks in science was taken. The difference between any two successive letter grades was taken as 1. If X had made an average of C in general science and an average of B during the student-teaching period the differential was taken as positive 1. If he had made a C in general science and an A during the student-teaching period the differential was taken as positive 2. If, on the other hand, he had made an average of C in general science and an average of D during the student-teaching period the differential was taken as negative 1, and so on. English, history, and mathematics were treated in the same manner. In fact, they were simpler than the courses in science in that they were known by the pupil as English, history, and mathematics right down thru his course. There was a tendency, on the other hand, to regard the different sciences as separate, a fact which may have rendered the results in the field of science less trustworthy than in the other fields. The differentials secured by this method were given scale values as follows:

Differentials	Scale Values
+2 or more	5
+1 up to two	4
0	3
—1 down to negative two	2
—2 or more	1

These values were then used as the basis for running correlations. The results of the two types of correlations computed in this study are given in Table VI.

TABLE VI. COEFFICIENTS OF CORRELATIONS BETWEEN PUPIL RATINGS OF STUDENT TEACHERS AND, FIRST, THE AVERAGES OF PUPIL MARKS RECEIVED IN VARIOUS SUBJECTS DURING THE STUDENT-TEACHING PERIOD COVERED BY THE PUPIL RATINGS; AND, SECOND, THE DIFFERENTIALS BETWEEN THESE AVERAGES AND THE AVERAGES OF MARKS MADE PREVIOUSLY BY THE PUPILS IN THE SAME SUBJECT-MATTER FIELDS

Subject	Grade	Number in Class	First r (Ratings—Marks)	Second r (Ratings—Differentials)
Plane Geometry	10	25	.29	—.47
Botany	11 and 12	17	.004	—.005
Physics	11 and 12	26	.16	.19
English	10	24	.14	—.69
English	10	30	.65	—.31
English	9	33	.18	—.19
Citizenship	12	30	.41	—.08
Government	12	20	.41	.36
American History	11	31	.12	—.03

Results of Fourth Study

The data for the fourth study were collected during the first semester of the present school year, 1933-34, from the pupils of 21 student teachers working in Greencastle, Indiana. As in the third study, the pupils were asked merely to make a general rating on a seven-point scale. In addition, however, each pupil was asked to state just below the rating what he regarded to be the student teacher's strongest point and what his weakest. This was done with the thought that it might throw some light on the charge that pupil ratings were based upon very superficial matters. If this were true, it seemed that one might expect pupils to name rather unimportant characteristics either as strong or as weak points.

In order to investigate this problem, the points given by pupils were grouped to the best of our ability under 16 heads. In spite of quite a variety of expression, it was rather evident that many of the pupils were trying to say about the same things. Table VII gives the results of this grouping.

TABLE VII. CHARACTERISTICS OF STUDENT-TEACHERS DERIVED FROM THE RATINGS OF 598 HIGH SCHOOL PUPILS, RATING 21 STUDENT TEACHERS, TOGETHER WITH THE NUMBER OF PUPILS MENTIONING EACH CHARACTERISTIC

Characteristics	Number of Pupils
1. Explanations clear and comprehensible	85
2. Ability to get pupils' point of view	53
3. Responsibility and dependability	29
4. Pleasantness	27
5. Self-control; poise	26
6. Open-mindedness; willingness to face facts	26
7. Thoro preparation; mastery of subject	25
8. Maintenance of good discipline	19
9. Fairness; freedom from favoritism	18
10. Willingness to help pupils with their difficulties	17
11. Forcefulness	16
12. Resourcefulness	16
13. Keenness of reasoning power	15
14. Sincerity and straightforwardness	14
15. Making subject interesting thru use of supplementary materials	11
16. Accuracy in presentation of facts	10
17. Failing to state either strong or weak points	32
18. Miscellaneous; those which when organized gave groups of less than ten	159
Total	598

Tho, as has been suggested, the main purpose of this part of the investigation was to get information concerning the characteristics which form the basis for pupil ratings, a number of coefficients were computed to see what light they might throw upon previous parts of this study. These are summarized in Table VIII.

TABLE VIII. VARIOUS COEFFICIENTS OF CORRELATION BASED ON DATA FURNISHED BY PUPIL RATINGS OF 21 STUDENT TEACHERS IN CLASSES RANGING IN SIZE FROM 10 TO 43

Basis of Computation	r
1. Between averages of chance halves	.85± .04
2. Between averages of the ratings of boys and averages of the ratings of girls	.64± .09
3. Between intelligence scores of student teachers and averages of the ratings of their pupils	.03± .12
4. Between averages of college marks of student teachers and averages of the ratings of their pupils	.06± 12

Discussion of Results

It should be made clear in the beginning that none of the four studies described includes enough cases to justify anything other than very tentative conclusions. These were made with the thought that if each person making even small excursions into the field of pupil ratings would report them, out of the accumulation of data there may be revealed certain rather definite trends.

It will be remembered, no doubt, that reliability coefficients obtained by using the chance half method are lower than the real reliability of the average ratings of the entire group. Taking the whole group in each case would be equivalent to doubling the length of a test so, if we have a reliability coefficient of .50 based on classes of given sizes, to assume these class sizes doubled and then the coefficients computed represents the reliability of the judgments of the whole group. To obtain these reliability coefficients it is necessary to apply Spearman's "prophecy" formula to the reliability coefficients obtained from the chance halves. For example, applying this formula[2] to .50, which is the lowest coefficient obtained in using either rating plan, we get .67; and applying it to .92, which is the highest one, we get .96.

With respect to the third study concerning the relationship between pupil ratings and marks, there is at least one other approach which we should have made, but which we overlooked until we had proceeded so far as to make it inconvenient to secure the needed data. It is quite possible that the differential between the average of the marks given to the pupils by the student teacher and the average of other marks given the pupil during the same period of time is more significant than either the mark given by the student teacher or the differential between this mark and the average of previous marks in the same subject-matter field.

In the fourth study in spite of the rather large number of cases in which the characteristics named were so varied as to defy classification into categories which would include ten or more statements, it is

[2] Spearman's "prophecy" formula: $r = \frac{Nr}{1-(N-1)r}$

interesting to note that such a large majority of the pupils thought along similar lines and that the characteristics named were such, I believe, as would command the respect of intelligent adults. Furthermore, tho obviously one cannot here repeat all the 159 replies under the miscellaneous group, I may state that to me none of these seemed irrelevant to good teaching.

Conclusions

In making studies of this type one tends to arrive at tentative conclusions of two kinds: first, those not based directly upon the statistical findings but which seem to emerge as a result of the work done; second, those based upon the statistical findings. The conclusions offered are of both kinds.

1. The morale of the pupils is improved by the opportunity to rate their teachers.

2. Student teachers welcome pupil ratings as a means of growth.

3. The fact that student teachers know in advance that they are to be rated by their pupils appears to stimulate the student teachers to do good work rather than to "play to the galleries."

4. The more often pupils are asked to rate teachers the more understandingly they appear to work and the more seriously they regard the undertaking.

5. A generally unfavorable attitude toward the school on the part of a pupil does not appear to affect his rating of each individual teacher. On the contrary, we have noted a number of instances where the general attitude toward the school has been greatly improved because of high esteem for particular student teachers.

6. On the basis of comparison with other studies it may be said that high school pupils' ratings of student teachers appear to be about as reliable as college students' ratings of their instructors.

7. When corrected for attenuation, such ratings appear to be about as reliable as results on many standardized tests.

8. In spite of a few exceptions, there is enough halo effect among the items of either form to make it inadvisable to ask for more than a general rating.

9. In the main, pupils' and teachers' judgments as to the presence or absence of the traits of the Purdue scale show little agreement. This may be due to a wide difference of opinion in interpreting the meaning of the traits, or, assuming agreement as to meaning, a great difference in keenness of perception of those indices which reveal the presence or absence of the traits. This difference of opinion of itself throws no light on the validity of either pupil or teacher ratings.

10. With respect to the three traits, stimulating intellectual curiosity, liberal and progressive attitude, and fairness in grading, especially the latter, pupils and teachers tend to have opposing views as to their presence or absence.

11. On the whole, pupils' ratings seem to be little affected by either the marks they receive directly from the student teacher or by the differential between these marks and the average of the marks received previously in the same field of study.

12. The fact that a high negative differential gives a low differential score and all but two of the class-group comparisons give considerable negative coefficients points to the conclusion that the more severe the teacher's marking the better the pupils like it. However, the results which might be obtained by running correlations between pupil ratings and the differentials between pupil marks received from student teachers and the averages of marks received from other teachers during the student-teaching period might invalidate such a conclusion. Another study should investigate this point.

13. Such evidence as we have tends to encourage a belief in the validity as well as the reliability of pupil ratings.

14. It would seem also, on the basis of this evidence, that the problem of pupil ratings is sufficiently important to justify some research bureau or foundation in going into the matter much further than any one individual is likely to be able to do.

Suggestions for Further Study

Mr. Bryan's article, previously mentioned, presents an admirable summary of unsolved problems with respect to pupil ratings. I should like to suggest a few that appear to me to be especially important.

1. How reliable is one's judgment as to who is teaching or helping him most? In other words, when one believes that a certain teacher is teaching him more than any other, to what extent is it really true that this teacher has taught him more than any other?

2. To what extent do people tend in their later years to regard as their best or poorest teachers those whom they so regarded while under their instruction?

3. What effect does the intelligence of the pupil group making a rating have upon the rating?

4. What effect does subject-matter have upon a pupil rating? The same teacher is perhaps more highly regarded in some of his classes than in others.

5. How would the results of pupil ratings compare with carefully equated results on standardized achievement tests?

6. How would pupil ratings made by groups of pupils under student teachers compare with the ratings of the pupils of these same teachers after they have had about a year of experience in public schools?

7. If a considerable group of teachers could be found, each of whom would teach various classes under widely different environmental circumstances, it would be interesting to know how the ratings made under these varying conditions would compare with one another.

A Comparative Study of Some Direct Techniques of Measuring Pupil Behavior in the Activity School

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Setting of the Problem

VERY much more of the learning situation should be analyzed and measured scientifically if genuine progress is to be made in the study of education. With progressive practices coming to the front, more weight is being attached to the conditions favorable to the general results of learning. Unfortunately the number of scientific studies of the learning conditions usually found in progressive schools and of the outcomes of progressive procedures are few.

One of the major contributions which progressive schools may make to education is the study of the conditions favorable to learning. A number of recent books, such as those written by teachers of Lincoln Elementary School of Teachers College, Columbia University, describe some conditions of learning and some of the outcomes, but there is a tendency to omit scientific evidence to support declarations of achievements and to omit scientific evidence of controls and conditioning factors.[1]

Regarding the nature of scientific studies needed in this field, Dewey[2] says:

". . . from the standpoint of progressive education, the question of method takes on a new and largely untouched form. It is no longer a question of how the teacher is to instruct or how the pupil is to study. The problem is to find what conditions must be fulfilled in order that study and learning will naturally and necessarily take place, what conditions must be present so that pupils will make the responses which cannot help having learning as their consequence."

When one reviews the scientific studies in the field of progressive education he finds that the few studies which were made have not been valid studies of progressive education for several reasons. In all cases the outcomes of traditional education were the only ones measured or they were largely overemphasized. Secondly, the investigations were conducted over too short a period to permit some of the higher

[1] "In writing an account of this work, the authors have not tried to prove any thesis nor to demonstrate by conclusive evidence that the best method for children is by means of units of work. They are convinced of the efficacy of this means of instruction but they cannot produce scientific data to substantiate their conclusions." Barnes, Emily Ann and Young, B. M., *Children and Architecture*, Lincoln School Curriculum *Studies*, Teachers College, Columbia University, 1932, p. xvi, preface.

[2] Dewey, John, "Progressive Education and the Science of Education," *Progressive Education* 5:204, July, August, and September, 1928.

and finer values of education to begin to operate. Again, all of the studies were handicapped by the inadequacy or lack of techniques of measuring the more subtle processes and products of growth in personality.

When one reviews the scientific studies in the field of traditional education which utilize techniques similar to those about to be reported in this paper, he finds a few. However, since the social and physical activities of children in traditional schools have been comparatively few and artificial in nature, direct techniques of measurement such as observational measurement have not been commonly employed above the pre-school level.

Origin of the Problem

In a four-year study recently completed by the writer, direct techniques of measurement making use of observers and stenographers in the classroom were employed in what is believed to be the first investigation of its kind in the field of progressive education.[3] Certain learning conditions were set up as commonly found in progressive schools. The growth in behavior of fifth and sixth grade children working under these experimental conditions was analyzed and measured. This was done by establishing and validating some specific objectives in personality development in the form of behavior trait-actions applicable to the situation. The trait-actions, 34 in number, were recorded during classroom periods of six types:

Type A—Practice or drill periods
Type B—Conference periods
Type C—Problem-solving periods
Type D—Creative work or construction periods
Type E—Directed study or research periods
Type F—Before-school periods

A different list of trait-actions was used for each of the types of periods. The six lists in use were the following:

PERIOD TYPE A
Practice or Drill Period

Code Letter[4]	
W2	Completing work sooner than others and not using time wisely
W3	Depending upon unnecessary help while working
W4	Not concentrating deeply upon work which requires close attention
R2	Not working as efficiently when the teacher leaves the room or is not nearby
P1	Carrying on conversation with neighbors when attention should be given elsewhere

[3] Pistor, F., "A Comparative Study of the Growth of Children under Traditional and Progressive Practices," Doctor's dissertation, New York University, New York, 1934.

[4] W2 is the code letter for Work-Spirit Two, or the second negative trait-action listed under Work-Spirit. The other letters used and what they denote are: R, Reliability; C, Coöperation; P, Courtesy; H, Housekeeping; N, Initiative; X, Positive Work-Spirit trait-actions. All the trait-actions are negatively stated except the ten Initiative trait-actions and the five X Work-Spirit trait-actions.

P2 Touching or borrowing property of other children without their permission
H2 Letting materials or paper remain on the floor
H5 Written work not neatly arranged, legible, nor free from blots and eraser marks

PERIOD TYPE B

Conference Period

N1 Suggesting an activity or problem for group consideration and undertaking
N2 Suggesting possible ways of carrying out an activity or a method of solving a problem
N3 Suggesting advantages and disadvantages of contemplated or executed procedure
N4 To volunteer to be chairman or a member of a committee
N5 To criticize work by bringing out good points or by offering suggestions for improvement
X5 To volunteer in emergencies for extra work which will be for the good of the group
P3 Not being courteous when speaking to others
C3 Refusing to help others when help is necessary
R3 Not holding oneself responsible to others for conduct

PERIOD TYPE C

Problem-Solving Period

N1 To suggest an activity or problem for group consideration and undertaking
N2 To suggest possible ways of carrying out an activity or a method of solving a problem
N3 To suggest advantages and disadvantages of contemplated or executed procedure
N6 To ask questions of other children in order to understand their reports more fully
N10 To defend a point which appears correct to the child even when the majority differ
X1 To bring in voluntarily from home or elsewhere, news-clippings, books, or selections containing appropriate material to be shared with others
X2 To engage voluntarily in art, construction, or experimentation at home or elsewhere, and to bring in the results for class consideration
X3 To bring in voluntarily, pictures, samples, or exhibits from home or elsewhere to explain or to show to the class
P3 Not being courteous when speaking to others

PERIOD TYPE D

Creative Work or Construction Period

N3 To suggest advantages or disadvantages of procedure
N5 To criticize work by bringing out good points or by offering suggestions for improvement
N6 To ask questions of other children in order to understand their reports more fully
N7 To ask the teacher for help when the work is not understood
N8 To show evidences of leadership in group work
N9 To carry out an original idea in art or in construction work or in experimental work. (Original here means original to the child.)
C1 To boss others in the group
C2 To exhibit actions which interfere with carrying forward the purposes of the group
C3 To refuse to help others when help is necessary

PERIOD TYPE E

Directed Study or Research Period

The trait-actions listed for this type of period are identical to those listed under Period Type A.

PERIOD TYPE F

Before-School Period (Morning)

R1	Not to perform assigned or selected maintenance duties
H4	Not to return books, tools, and materials clean and undamaged
X4	To engage in voluntary work for the class after school or on Saturday
H3	Not to keep a clean, orderly locker
W1	Not to use spare time wisely at the beginning of a session
W5	Not to be prompt in getting materials, in organizing them for work, and in getting started

Before-School Period (Afternoon)

R1	Not to perform the assigned or selected maintenance duties
H1	Not to keep books and materials neatly arranged in desks
W1	Not to use spare time wisely at the beginning of a session
W5	Not to be prompt in getting materials, in organizing them for work, and in getting started

Pairs of observers were used in the classroom during period-types A, E, and F. Pairs of observers and a stenographer were used in period-types B, C, and D. The observers were equipped with lists for the particular type of period observed and mimeographed seating charts on which to record in code the trait-actions manifested. The stenographic notes were inspected by pairs of interpreters, equipped with lists of trait-actions similar to those of the observers, who culled the trait-actions from the manuscripts. The trait-actions were counted in the final tabulation only when they were reported for the same lesson by at least two of the workers. The techniques proved markedly too highly reliable.[5]

Statement of the Problem

Some of the data from the author's experiment were used to study three possible methods of recording behavior trait-actions of children and to compare the results when using the three methods. The three methods considered were: (1) the observer technique, (2) the interpreter technique, and (3) the combination technique, a combination of (1) and (2).

The observer technique consisted of using a pair of trained observers who worked simultaneously but independently. They were equipped with a list of nine trait-actions and a mimeographed seating chart on which to record in code the trait-actions manifested. The trait-actions of the two observers were compared. No trait-action was included in the final tabulation unless it was reported for the same lesson by both observers.

The interpreter technique consisted of using a stenographer to take down the words of the children and the teacher. The stenographer

[5] For details concerning controls, experimental learning conditions, other possible minor variables, tests of reliability employed, and outcomes of the experiment, see the author's dissertation or forthcoming magazine articles.

included running comments on the phases of the activity in her notes. The manuscripts of the stenographer were inspected by a pair of interpreters who worked independently. Using the same lists of trait-actions as the observers, they culled the trait-actions from the manuscripts. The reports of the interpreters were compared. No trait-action was included in the final tabulation unless it was reported by both of the interpreters.

The combination technique consisted of using a pair of observers and a stenographer working independently during the same classroom period. The stenographic record was interpreted by a pair of interpreters. The trait-actions reported by the two observers and the two interpreters were compared. No trait-action was included in the final tabulation unless reported by at least two of the four workers.

Procedure

Two trait-actions were selected as well suited for this comparative study. The two trait-actions were:

N2 Suggesting possible ways of carrying out an activity or a method of solving a problem
P3 Not being courteous when speaking to others

The data used for this study were obtained from records of eight series of lessons, each series consisting of six lessons. Three of the lessons were of the problem-solving type and three were of the conference period type. The problem-solving period was a class meeting during which the children considered one or more challenging problems arising in the course of what they had been doing. The conference period was a class meeting during which the pupils discussed the affairs of the group, brought together individual points of view, and arrived at concerted judgment and action.

TABLE I. COMPARISON OF N2 TRAIT-ACTION TOTALS OBTAINED BY THE USE OF THREE METHODS

Lesson Series	Observer Only	Interpreter Only	Combination
1	30 (67%)	38 (84%)	45
2	10 (71%)	11 (78%)	14
3	95 (79%)	112 (93%)	120
4	127 (92%)	133 (96%)	138
5	104 (94%)	105 (95%)	110
6	70 (91%)	77 (100%)	77
7	50 (94%)	50 (94%)	53
8	90 (89%)	99 (98%)	101

Comparisons Made with Trait-Action N2

Table I shows that for lesson series 1, the combination technique yielded 45 trait-actions; the observer technique yielded 30, or 67 per cent as many; and the interpreter technique yielded 38, or 84 per cent as many. The table shows the results of similar comparisons made

with seven other series of lessons. In each case the interpreter technique yielded as many or more trait-actions than the observer technique. Also, in most cases, the combination technique yielded more trait-actions than either one of the other two techniques.

The probable reason that trait-action N2, "Suggesting possible ways of carrying out an activity or a method of solving a problem," lends itself more readily to the interpreter technique is that its manifestation consists largely of words rather than of action. Assuming that a stenographer recorded all the words of the lesson, her manuscript would enable an interpreter to check his count of N2 trait-actions, while a classroom observer of such a trait-action would have to make quicker interpretations and would have no opportunity to check his record.

The combination technique appears to be superior in the case of trait-action N2 because a double check is made on every manifestation and fewer trait-actions are lost on account of errors in observation.

TABLE II. COMPARISON OF P3 TRAIT-ACTION TOTALS OBTAINED BY THE USE OF THREE METHODS

Lesson Series	Observer Only	Interpreter Only	Combination
1	11 (92%)	3 (25%)	12
2	17 (100%)	5 (29%)	17
3	6 (100%)	1 (17%)	6
4	7 (78%)	4 (44%)	9
5	18 (95%)	9 (47%)	19
6	20 (87%)	7 (30%)	23
7	9 (100%)	3 (33%)	9
8	11 (85%)	5 (38%)	13

Comparisons Made with Trait-Action P3

The trait-action P3, "Not being courteous when speaking to others," was studied in the same way by using the reports for the same series of lessons. Table II shows that the combination technique yielded 12 trait-actions for lesson series 1; the observer technique yielded 11, or 92 per cent as many; and the interpreter technique yielded 3, or 25 per cent as many. The table shows the results of similar comparisons made with seven other series of lessons. In each case the observer technique yielded more trait-actions than the interpreter technique. Likewise, the combination technique often yielded more than either of the other two techniques.

The probable reason that trait-action P3 lends itself more readily to the observer technique is that its manifestation involves action as well as words, or some voice inflection to render the act as discourteous. It was found that the discourtesy of a pupil often was not caused by what he said, but by the manner in which he spoke. It was necessary to know the relation of his words and actions to the whole group situation. Because of this, the classroom observer was better able to judge and record trait-action P3 than the interpreter of the stenographer's record.

With trait-action P3, the combination technique appears superior to either of the other two techniques because it offers an opportunity to double check the trait-actions and may occasionally yield more trait-actions.

Conclusions

While the comparisons made in this paper are limited to only two of the trait-actions and the sampling has been limited to 48 lessons, one may venture the following conclusions:

1. Some trait-actions lend themselves better to the observer technique and others to the interpreter technique.
2. Trait-actions manifested chiefly thru words rather than thru action appear to be recorded more efficiently thru the interpreter technique.
3. Trait-actions manifested chiefly thru action rather than words, or thru inflection of voice and mannerisms, appear to be recorded more efficiently thru the observer technique.
4. The combination technique probably proves most effective for some trait-actions.
5. When measuring a miscellaneous number of trait-actions with the same children simultaneously, the combination technique will probably prove most efficient.

The techniques of measurement discussed in this paper should be more widely used to measure the subtle phases of pupil growth. They are especially valuable in an activity school where much natural social and physical activity of pupils is permitted.

An Experiment in the Content of High School Biology

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AMONG the criticisms directed at the schools of today may be found the charge that the subject-matter taught in the various courses does not carry over or transfer into actual life situations. This criticism is based on the theory that in curriculum construction the content material should parallel rather closely the normal expectancy of life activities. If then, there is but little transfer, it is due to the fact that pupils are not aware or made aware of the relationships existing between the things they are taught in the school and the application of those things in the everyday world.

There is a possibility that this challenge may be met so as to satisfy ourselves as to the extent of its truth or universality. Seven years ago an attempt was made to find out what connections boys and girls who had had physics might make between the scientific theory of the principles taught them in the physics class and the practical applications of those same principles as found in their environment. The results, as reported in the *Proceedings of the Fourteenth Conference on Educational Measurements*, tended to strengthen the claim that pupils did not see these connections.

We must not forget, however, that obliviscence plays its part. To illustrate: the term "Boyle's Law" may have been perfectly well understood at the time it was taught, but the passage of time and the law of disuse and disappearance have conspired to make it just another part of one's inexplicable vocabulary. "Yes, I remember the term," you say, "but for the life of me I can't tell you what it means." Naturally, then, it would involve a considerable amount of guesswork to identify a practical illustration of this law with the law itself. Consequently, a further step should be taken by those interested—that of having the scientific action of the phenomenon explained and then correlated with its theory or principle. So far, no one has undertaken a study of this sort.

The results of the physics study provided opportunity for speculation in one field, but nothing further was done to make a similar analysis in other subject fields until the present year, when another seminar group was prevailed upon to make a corresponding type study in the field of biology. The group consisted of Miss Janet Stroup, Miss Lois Eldridge, Mr. Elmer Sander, and Mr. James Irving. It is because of their efforts that the present report is possible, altho pressure of time has made it impossible to make all the desired tabulations.

The first task was to make a list of biological principles taught in secondary school biology texts, and the second, to develop a set of illustrations or activities which might be explained by one or more of these principles.

Because of the shortness of time available for the preparation of the test, it has several imperfections, so that those of us who developed it lay no claim to its being above criticism. However, even with its faults we feel that it has still served a purpose.

The only group available for taking the test was to be found in the Bloomington High School. The principal, Mr. V. L. Tatlock, gave permission for the test to be given to the students in two of the last-period study halls on Thursday, March 22. Sixty-eight freshmen were in one group and 116 upper-classmen in the other, making a total of 184 students.

The distribution by grade and sex was as follows:

TABLE I. DISTRIBUTION BY GRADE AND SEX OF 184 STUDENTS TAKING THE TEST

Grade	Boys	Girls	Total
9	35	33	68
10	21	9	30
11	30	32	62
12	10	14	24
Total	96	88	184

Because of the brevity of time at our disposal, it has not been possible to analyze the tabulated data in such detail as to reveal all the types of significant information which they contain. This report, then, will contain reference to only such items as have seemed to be the more obvious. These items are: the difference in scores on the part of those who have had some biological science as compared with those who have not had any; the occurrences which received the largest percentages of correct answers and those which received the smallest; the items in which occurred the greatest discrepancies between boys and girls; the items or grades in which existed the widest variations in incorrect responses; the items missed entirely by certain grade groups; and the most common incorrect responses.

In Grade 9, there were 5 boys who were studying biology who made an average score of 18.6, and 30 who had had no biology who made an average score of 9.3, making a difference of 9.3 in correct responses. There were 3 girls who had had biology and who made a score of 9.7, and 30 with no biology who made a score of 8.7, making a difference of only one correct response. In Grade 9, then, there were 8 individuals who made an average of 15.3 in correct responses, and 60 with no biology who made an average of 9.0, giving a difference of 6.3. In tabulating the results of Grades 10, 11, and 12, no distinction was made between grade or sex. The tabulation showed that 82 who had had biology, physiology, or botany, made an average score of 14.3, while 34 who had not had any of these sciences made an average score of 10.9, the difference in favor of the first group being 3.4.

It is not entirely safe to draw any hard and fast conclusion from the above figures, but even so, it is rather evident that one answer to

our question has been made, namely, that a contact with the terms used in some biological science has certainly enabled those who have studied that subject to have a better vocabulary understanding in a test of this type. Of course, the statement has already been made that the studying of any particular course does not necessarily insure one hundred per cent response on this sort of test, but, even taking into account obliviscence, there has been a definite amount of remembrance which shows that the course has not been entirely in vain for the boys and girls who studied it.

There was insufficient time in which to compute percentages by sex and grade, altho each of the 40 items was so tabulated both for boys and for girls. These percentages were divided into two groups: those amounting to 50 per cent or more, and those with less than 10 per cent. In the first case, they were identical for boys and girls, namely, items 2, 3, 6, 8, 12, 13, 18, 20, and 40. Because of the nature of these nine items they might well be answered by common sense or experience, or as a result of previous study in general science.

There were also nine items identical for boys and girls in which the percentages of correct responses were less than 10. These were items 15, 16, 21, 26, 33, 35, 36, 37, and 38. For girls there was an additional one in which the correct responses were less than 10 per cent, item 7. An examination of these last nine items reveals that they are more definitely a part of the scientific phase of biology than is the first group of nine. Item 36, which concerns natural selection, had not more than 1.5 per cent of correct responses.

Another interesting phase of this comparison of percentages came to light in the discovery that there were certain items in which the difference of correct response between boys and girls was 10 per cent or more. This list includes some items which are found in the previous two lists, and others that were quite different; namely, items 2, 3, 5, 6, 7, 8, 10, 18, 19, 20, 30, and 40. Among these the greatest discrepancies were in items 2, 3, 8, 18, and 20. In only one instance was the difference in favor of the girls, and that was in respect to item 19, which deals with dancers who cover their bodies with gold paint. On the other 11 items the differences were all in favor of the boys. If there is any significance in the results, the question may well be asked as to whether this difference is due to the fact that boys have more direct contact with such biological occurrences as are contained in this certain test or whether they are more observant than girls.

There were certain items which were missed entirely by certain sex-grade groups. The most outstanding of these omissions were: item 16, by 10th grade boys and by 9th, 10th, and 11th grade girls; item 21, by 10th and 12th grade boys and by 9th grade girls; item 36, by 9th, 10th, and 11th grade boys and by 10th, 11th, and 12th grade girls; and item 37, by 11th and 12th grade boys and by 12th grade girls. Reference to the test itself will indicate that items 21, 36, and 37 did of themselves predict such a result.

Certainly, in a test of this sort the element of guesswork must enter in, especially on the part of those who have had no biology. Unfortunately, we were not able to tabulate the results separately for those who

had had biological science and those who had not, but, since the 9th grade boys and girls showed a variation of more than ten different incorrect responses on 50 per cent of the items, it is perfectly obvious that guesswork played a very strong part in the answers. If these variations could have been reduced to percentages, I am sure that a much more significant conclusion could be drawn relative to the special vocabulary involved in the 58 biological phenomena that are listed.

The last phase of the study to be interpreted concerns the most common errors made in this matching test. The criterion employed for the most common error was an occurrence of five or more times. Phenomena 10, 43, and 56 were the most common explanations offered. The more outstanding of the incorrect responses are presented in the order of the occurrences and are so stated as to indicate the occurrences and the incorrect responses used to explain them.

1. Caterpillars become moths or butterflies via adulteration.
2. Birds in flight become exhausted by migration.
3. Children do not contract smallpox, even when exposed to it, because of quarantine.

13. Budding explains why cutting excessive vines from grape stalks produces better fruit.
17. It is hybridization that causes a snake bite to enter our entire system.
20. Dairies boil their milk bottles in order to pasteurize them.
21. The Riley Hospital experiment is done for natural selection.
22. Humidity keeps our bodies from rising beyond 98 degrees.
27. Chickens are hatched from fertilized eggs because of inbreeding.
36. The weakest fish die in a warm stream because of resuscitation, adaptation, or humidity.

It is always possible to draw certain conclusions from this type of study, but whether or not they are the proper ones still remains a moot question. There are at least two conclusions to be made: first, that students who have had the opportunity to study some biological science have a better acquaintance with the vocabulary of that science; and second, that teachers need to insist even more than they do at present upon the mastery of an understanding of a vocabulary which is peculiar to the particular biological science being studied. This understanding can probably be achieved by a more constant reference to their contact with those biological occurrences which abound in our everyday life.

Criticisms

The very nature of the test has tended to decrease its validity. In the first place 58 biological phenomena must have produced a fear of frustration on the part of boys and girls who had not studied any biological science. The mere task of trying to familiarize themselves with the various terms must have introduced more than the usual amount of guesswork.

The second serious criticism is that among the 58 separate phenomena there was a considerable amount of overlapping, not just one item with another item, but with several other items. For this reason the tabulation of correct and incorrect responses must be considered merely as a general one.

If the test were to be revised it should be modified as a result of the above valid criticisms. All possible overlapping should be eliminated. Such elimination would thereby reduce the number of terms. As a consequence, the eye movements of the boys and girls taking the test would be relieved of a considerable amount of strain. The mental reaction resulting thereby ought to produce a more favorable attitude with regard to the test to be taken.

A Test in Applied Biology

Cover Page

Fill in blanks below

Name of pupil.....Date.....
Date of birth.....Boy or girl.....
Name of school.....
Class or grade in school.....
Occupation of father or guardian.....
What occupation do you expect to enter?.....

If you have had any of the sciences listed below, write after each one the number of years or half years you studied each.

General Science
Physical Geography
Botany
Biology
Physiology and Hygiene
Zoölogy
Chemistry
Physics
Home Economics

Have you failed in any of the above subjects?.....
If so, what ones?.....

DO NOT TURN PAGE UNTIL TOLD TO DO SO BY THE TEACHER

Biological Phenomena

A. Instructions to the pupil:

In your school work you have answered many matching tests, in which you put in front of one word or statement the number of the word or statement in another column that corresponds to the first one. In this test you have a list of what we call phenomena in biology, which are numbered from 1 to 58. On two other sheets you will find 40 statements or occurrences, each one of which may be explained by one of these numbered phenomena. In front of each statement please write in the number of the phenomenon which you think best explains the statement. For example: on page 3 number "2" is written in the blank space in front of the first illustration, numbered "a," because the phenomenon of hibernation explains it.

N. B. It is well for you to know that some of the phenomena are used more than once and some are not used at all.

B. List of biological phenomena:

1. Conjugation
2. Hibernation
3. Metamorphosis
4. Migration
5. Peristalsis
6. Immunity
7. Adulteration
8. Fatigue (exhaustion)
9. Locomotion
10. Reflex Action
11. Mastication
12. Metabolism
13. Resuscitation
14. Inbreeding
15. Absorption
16. Alternation of Generations
17. Germination
18. Osmosis
19. Photosynthesis
20. Pollination
21. Transpiration
22. Tropism
23. Budding
24. Grafting
25. Life Cycle
26. Seedling
27. Pruning
28. Adaptation
29. Assimilation
30. Circulation
31. Digestion
32. Fission
33. Mendel's Law
34. Mutation
35. Nutrition
36. Reproduction
37. Respiration
38. Specialization
39. Hybridization
40. Cellular Structure
41. Excretion
42. Fertilization
43. Inheritance
44. Irritability
45. Maturing
46. Secretion
47. Stimulation
48. Fermentation
49. Humidity
50. Pasteurization
51. Putrefaction
52. Quarantine
53. Vaccination
54. Erosion
55. Sterilization
56. Natural Selection
57. Turgidity
58. Perspiration

LIST OF BIOLOGICAL OCCURRENCES FOUND IN EVERYDAY LIFE

2 a. A snake spends the winter in a state of inactivity.

——— 1. Caterpillars become butterflies or moths.

——— 2. Birds in flight have been known to dash against the side of tall buildings and fall to the ground thoroughly exhausted.

——— 3. Some children do not contract smallpox, even when they are exposed to it.

——— 4. People close their eyes when having a flashlight picture taken.

——— 5. Fish swim; frogs leap; and dogs run.

——— 6. Air may be brought back into the lungs of one who has been nearly drowned.

——— 7. Digested food passes from the alimentary canal into the blood.

——— 8. Water from the soil passes into the roots of growing plants.

——— 9. Under proper conditions, corn, when planted, will sprout and grow.

———10. Carbon dioxide, water, and sunlight are necessary in the manufacturing of carbohydrates.

———11. When plants are transplanted, care must be taken not to expose their roots to the air too long before they are replanted or they may die.

———12. Quinces and pears may be made to grow on the same tree.
———13. Cutting excessive vines from grape stalks produces better fruit.
———14. The beak of a woodpecker is short and pointed; a necessity for its use.
———15. A sunflower turns with the sun.
———16. Food absorbed gives us energy.
———17. A poisonous snake bite may poison our entire system.
———18. Milk, heated and cooled quickly, is safe for the children to drink.
———19. Dancers who cover their bodies with gold paint must remove it as soon as possible or they will die.
———20. Dairies boil their milk bottles.
———21. An experiment is being conducted at Riley Hospital to see if children when allowed to choose their own food will select the proper food.
———22. The normal temperature of our body does not rise beyond 98 degrees on the hottest day.
———23. A biology teacher advised red-haired girls who did not want to have red-haired children to marry brunettes in order to reduce the possibility of red-haired children.
———24. If close relatives marry there is a possibility that their defects may be intensified.
———25. If you place a lump of salt on a frog's back it causes him to scratch.
———26. Some dogs can track a rabbit by smell, others by sight.
———27. Chickens are hatched from fertilized hen eggs.
———28. Our body is composed of infinitely small units.
———29. In the presence of tasty foods our mouths become filled with saliva.
———30. Coffee quickens nervous activities.
———31. Many schools provide cod liver oil for undernourished children.
———32. Yeast causes bread to rise.
———33. The flower-head of the dandelion closes after the sun has gone down.
———34. Cider becomes hard.
———35. A youngster avoids the smoke of a wood fire.
———36. When the water in a stream grows too warm, the weakest fish die.
———37. Only the strongest blades of grass survive in a dry season.
———38. A wilted lettuce leaf becomes crisp when left in cold water.
———39. Basketball teams should never eat a heavy meal immediately before playing a game.
———40. After strenuous exercise dogs pant.

Possibilities in the Consolidation of Indiana Schools

H. L. SMITH, Dean of the School of Education, Indiana University

EARLY in the year we received a request from the Rural Education Division of the Department of Superintendence of the National Education Association for information concerning a number of problems peculiar to the organization and administration of rural education. One of the problems proposed by the National Division was the following: How can greater consolidation of rural schools be effected without increasing the burden on the taxpayer? A number of approaches to the solution of this problem presented themselves. We chose, however, to limit our study to one specific task and modified the original problem to read: How can greater consolidation of rural schools be effected by using only those building facilities already available but not at present being utilized to their full capacity?

To secure information concerning the location, capacity, and present enrollment of the school buildings of the state we used the following procedure: from Bowen's *Atlas of Indiana* an outline map of each of the 92 counties of the state was made. This map included the outlines of the townships. The map of each county was mailed to the county superintendent of that county with a request that he name and locate each school building in his county and indicate according to a key placed on the outline map: (1) the type of school housed in the building, whether one-teacher, two- to four-teacher, over four-teacher elementary; elementary and high school; or high school only; and (2) the attendance area for each school building, using a red line for the boundaries of the elementary schools and a blue line for the high school boundaries. Accompanying each map were blank forms on which was to be secured for each school building the following information: (1) name of the school building; (2) date of erection; (3) state of repair—good, fair, poor; (4) can it be successfully repaired; (5) can it be successfully added to; (6) should it be replaced with a new building; (7) elementary and high school capacity of the building; (8) present enrollment of the building for the combined first six grades, and for each of the upper six grades; (9) is the size of the site adequate; (10) can the site be enlarged; and (11) ownership of the property—city, town, township, joint.

May I at this point express my appreciation of the coöperation given us in this study by the county superintendents and the city superintendents who replied. I wish also to acknowledge my indebtedness to Dr. F. R. Noffsinger, assistant in the Bureau of Coöperative Research, who tabulated the material and organized the content of this paper.

A satisfactory response from superintendents was secured. All but three counties sent in the desired information. In many cases, however, the county superintendents did not supply information concerning the town and city school buildings located within the county. Upon receipt

CHART 1. Location of elementary schools in Indiana which are not combined in the same building with high schools. Junior high schools which do not include the ninth grade have been classed as elementary schools.

of the map and information from each county the blanks were inspected and information blanks were mailed to the city or town superintendents whose schools were not included in the data provided by the county superintendent.

In order to show the location of school buildings in adjacent counties, the information found on the county maps was transferred to two large outline maps of the state, one showing the elementary schools and one showing the high schools of the state.

Time will not permit the giving of the complete findings of the study. Typical situations will be described to indicate how greater consolidation could be effected by using only present building facilities.

To secure a rough measure of the extent of possible consolidation we can compare the capacities of the buildings now available with the enrollments now in those buildings. Two groups of counties have been chosen from which to illustrate this rough measure. One group is made up of eight counties in the north central part of the state, including the following: Cass, Carroll, Clinton, Boone, Miami, Howard, Tipton, and Hamilton. For this group of counties there is capacity for 50,730 elementary and high school pupils. For the same area the *Indiana School Directory* shows an enrollment of 44,565 pupils. The excess of capacity over enrollment amounts to 6,165, or approximately 14 per cent. Of this group of counties Clinton county shows an excess of 46 per cent; that is to say, there are sufficient school building facilities in Clinton County to provide for almost half as many pupils more than are at present enrolled. Only two counties show crowded conditions—Howard County, where the school buildings provide adequately for 578 fewer pupils than are actually enrolled; and Carroll County, where the school buildings provide for 72 pupils fewer than are enrolled. In the latter county, however, there are 429 pupils of Flora provided for temporarily in a community house due to the burning of the school building at that place.

A second group of counties along the eastern border of the state was studied as a check on the first group. This second group is made up of the following 12 counties: Blackford, Jay, Wells, Adams, Delaware, Randolph, Henry, Wayne, Rush, Fayette, Union, and Franklin. The combined capacities of the school buildings of these twelve counties is 80,804, while the combined enrollments for the same counties is only 64,584, an excess of 16,220 pupil capacity, or 25 per cent of the present enrollments. In the second group of counties none shows an excess of enrollment over capacity. The range of excesses of capacity over enrollments is from 15 per cent in Jay County to 57 per cent in Union County.

If the two groups of counties are considered together, the combined capacities amount to 131,534 with combined enrollments of 109,149, an excess of 22,385 pupil capacity over enrollments, or 20.5 per cent of the present enrollments. If the same ratio would hold true for the state as for the 20 counties studied, there would be school building capacity in the state for approximately 150,000 more pupils than are at present enrolled.

Of course there are many of the buildings now in use that are wholly unfit for school purposes. Many such school buildings could be razed and the pupils now attending them transferred to nearby suitable buildings having excess capacity. Such consolidation could be effected at once and at a saving to the taxpayers involved.

CHART 2. Location of high schools and combined elementary and high schools in Indiana. Junior high schools which include the ninth grade have been classed as high schools.

TABLE I. CAPACITY AND ENROLLMENTS OF SCHOOL BUILDINGS IN A GROUP OF NORTH CENTRAL INDIANA COUNTIES

County	Capacity of Buildings	Present Enrollments	Excess of Capacity over Enrollments	Per Cent of Excess
Boone	5,101	4,560	541	12
Carroll	3,305	3,377	—72	—2
Cass	8,610	6,724	1,886	28
Clinton	9,030	6,180	2,850	46
Hamilton	5,321	5,081	240	5
Howard	8,964	9,542	—578	—6
Miami	6,479	5,983	496	8
Tipton	3,920	3,118	802	26
Total	50,730	44,565	6,165	14

TABLE II. CAPACITY AND ENROLLMENTS OF SCHOOL BUILDINGS IN A GROUP OF EAST CENTRAL INDIANA COUNTIES

County	Capacity of Buildings	Present Enrollments	Excess of Capacity over Enrollments	Per Cent of Excess
Adams	5,343	4,044	1,299	32
Blackford	4,170	3,072	1,098	36
Delaware	16,887	13,478	3,409	25
Fayette	4,375	3,600	775	22
Franklin	3,480	2,906	574	20
Henry	9,590	7,622	1,968	26
Jay	5,239	4,561	678	15
Randolph	6,975	5,567	1,408	25
Rush	4,900	3,718	1,182	32
Union	2,125	1,350	775	57
Wayne	11,995	10,307	1,688	16
Wells	5,725	4,359	1,366	31
Total	80,804	64,584	16,220	25

Many examples may be found where a few additional pupils may be cared for by a school system without an increase in the teaching staff. Such conditions are most likely to appear where district or one-teacher schools exist within sight of a large town or city school system. An example in point is found in Jay County. Portland, the county seat, has an elementary school building capacity of 1,200 pupils with only 733 pupils enrolled, an excess capacity of 467 elementary school pupils. In the same township with Portland are six one-teacher schools with a combined enrollment of 181 pupils. In three neighboring townships, to the south, to the east, and to the west, are 18 additional one-teacher

schools with a combined enrollment of 458 elementary pupils. Almost all of these schools could be transported to Portland without the need for additional building facilities and with considerably fewer than 24 additional teachers. Portland also has a high school excess capacity of 200 pupils. Within transporting distance of Portland are three high schools, each with enrollments of fewer than 100 pupils—Bryant has 76 pupils; Poling, 86 pupils; and Governor I. P. Gray, 87 pupils. Two of these three small high schools could be provided for in the Portland high school building with but a slight increase in the present teaching staff.

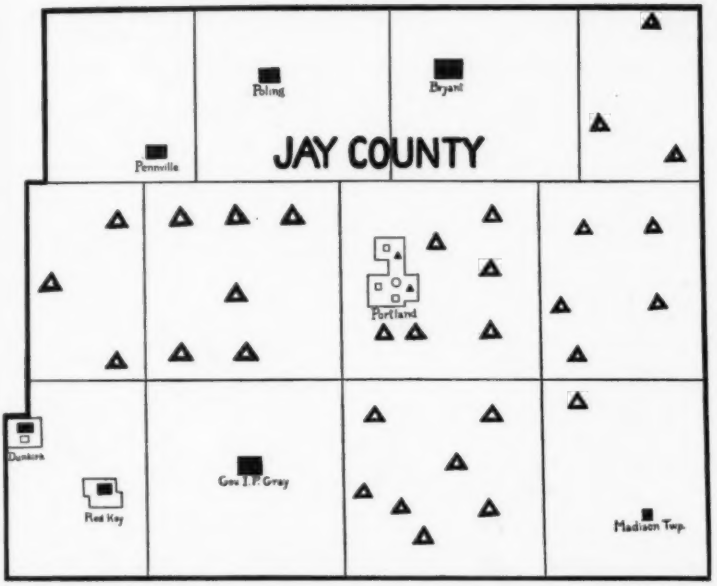

CHART 3. Location of the school buildings of Jay County. The open triangles represent one-teacher elementary schools; the closed triangles, two- to four-teacher schools; the open squares, more than four-teacher elementary schools; the closed squares, combined elementary and high schools; and the open circles, separate high schools.

Another example of the same type is found in Cicero Township, Tipton County, the township surrounding Tipton. The elementary (Grades 1 to 6) school buildings of the city of Tipton have an excess capacity of 111 pupils. In the same township are seven one-teacher schools with a combined enrollment in Grades 1 to 6 of 135 pupils, almost all of whom could be transported to Tipton with reduced cost and increased educational advantages to the children involved.

TABLE III. ENROLLMENTS OF SCHOOLS IN CICERO TOWNSHIP, TIPTON COUNTY

School	Number of Pupils (Grades 1–6)
Beech Grove	27
Clay	21
Dixon	7
Fairview	26
Independence	18
Jackson	21
Todd	15
Total	135

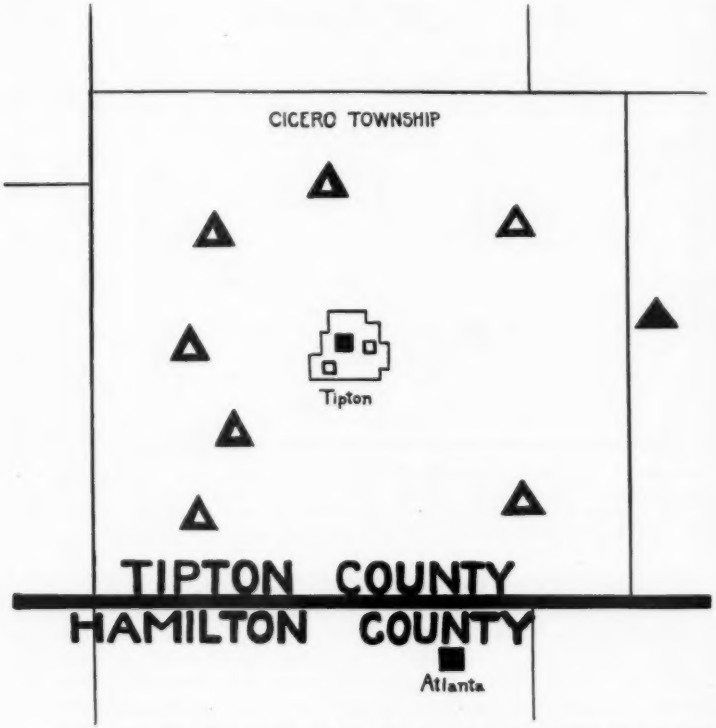

CHART 4. Location of the school buildings in Cicero Township, Tipton County. The key is the same as that used in Chart 3.

At Clinton in Vermillion County, four elementary school buildings with a pupil capacity of 1,430 house only 885 pupils (Grades 1-6), leaving an excess capacity of 545 pupils. In the same township are 16 elementary schools ranging in enrollment from 10 in Coon Hollow to 249 in Fairview. The combined enrollment of all but the three largest of these 16 schools amounts to only 542 pupils, all of whom could be adequately cared for in the Clinton city schools without additional building facilities and with a considerably less number of teachers than the 24 now required. In this township alone there is a school building capacity of 1,416 pupils in excess of the 3,019 at present enrolled, 47 per cent greater building capacity than required.

TABLE IV. ENROLLMENTS OF SCHOOLS IN CLINTON TOWNSHIP, VERMILLION COUNTY

School	Number of Pupils
Centenary	115
Clinton*	1,842
Coon Hollow	10
Cromptons Hill	101
East Union	49
Fairview	249
Geneva	9
Hazel Bluff	44
Jacksonville	163
Klondyke	39
Sandytown	25
Scotts	19
Smiths	57
Spanglers	27
Syndicate	10
Universal	223
West Union	37
Total	3,019

*The Clinton schools include a high school building and four elementary school buildings, one of which has a capacity of 180 but has been unoccupied for the last three years.

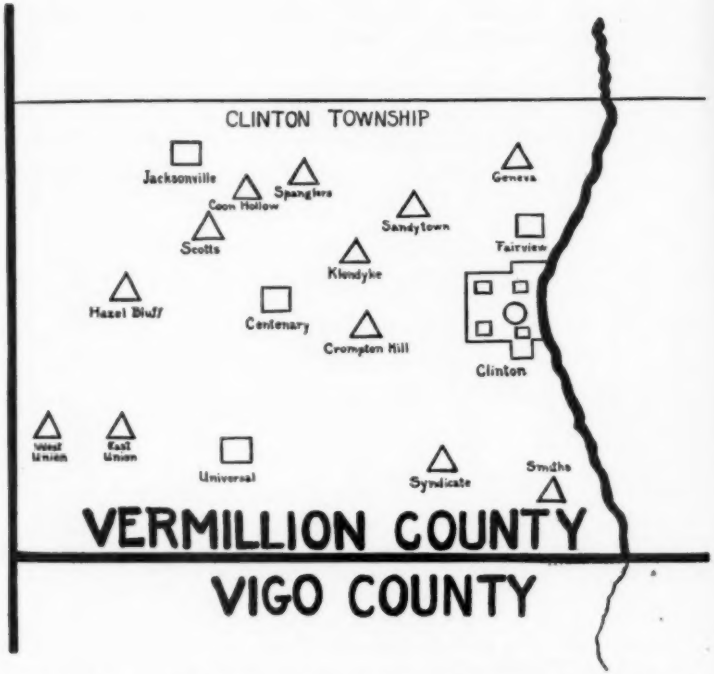

CHART 5. Location of the school buildings in Clinton Township, Vermillion County. The key is the same as that used in Chart 3.

When larger units than the township are considered in the problem of consolidation, the question of a suitable attendance area is immediately involved. Dr. R. W. Holmstedt, in working on another phase of rural school consolidation, estimated that a circle with a radius of 10 miles would provide a satisfactory general standard for an attendance area. Accepting such a standard attendance area, many examples of possible consolidation may be found within the state where no additional building facilities need be provided.

First let us see the results of applying such a standard 10-mile radius circle to the schools of one county. Huntington County has 12 highly consolidated townships containing 384 square miles, less than 1¼ times the standard attendance area. Yet there are 14 high schools in the county; a sufficient number of schools to provide for an area of approximately 3,400 square miles, a territory almost nine times as large as Huntington County. The total elementary enrollment of the county is 4,515 pupils, while the high school enrollment is 1,900 pupils, a school system which easily could be provided for in two high school buildings and four or five elementary school buildings.

TABLE V. ENROLLMENTS IN THE 14 SCHOOL CORPORATIONS OF HUNTINGTON COUNTY

School	Elementary Enrollment	High School Enrollment
Clear Creek	188	83
Dallas	218	85
Huntington City	1,902	769
Huntington Township	386	146
Jefferson Township	160	67
Lancaster Township	202	90
Markle	119	41
Polk Township	109	49
Roanoke	308	132
Rock Creek Township	124	70
Salamonie Township	327	166
Union Township	220	84
Warren Township	139	69
Wayne Township	113	49
Total	4,515	1,900

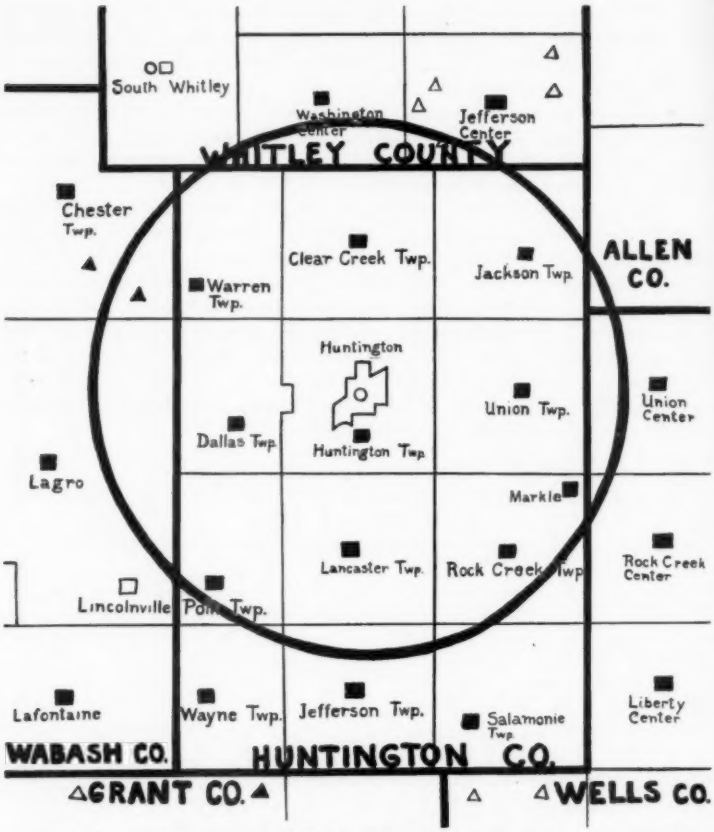

CHART 6. Location of the school buildings in Huntington County. The circle has a radius of 10 miles and has its center in the city of Huntington. In addition to the separate high school building indicated in the city of Huntington, there are elementary schools. The key is the same as that used in Chart 3.

Fayette County offers an excellent example of how greater consolidation of high schools can be effected without increasing building facilities. Connersville, the county seat, is located in the center of the county and has a high school capacity of 800 pupils with an enrollment of only 604 pupils. The farthest corner of the county is only slightly more than 10 miles distant. Six high schools are supported by the townships out-

side of Connersville. Not one of the high schools has an enrollment of over 55, and the combined enrollment of the six high schools is 284. Within the 10-mile circle drawn about Connersville are also four high schools in four surrounding counties, all with enrollments of fewer than 100, and one with an enrollment of only 20 high school pupils. At least five of these 10 small high schools within the 10-mile circle could be transported to Connersville without adding materially to the cost, or without the need for additional building facilities.

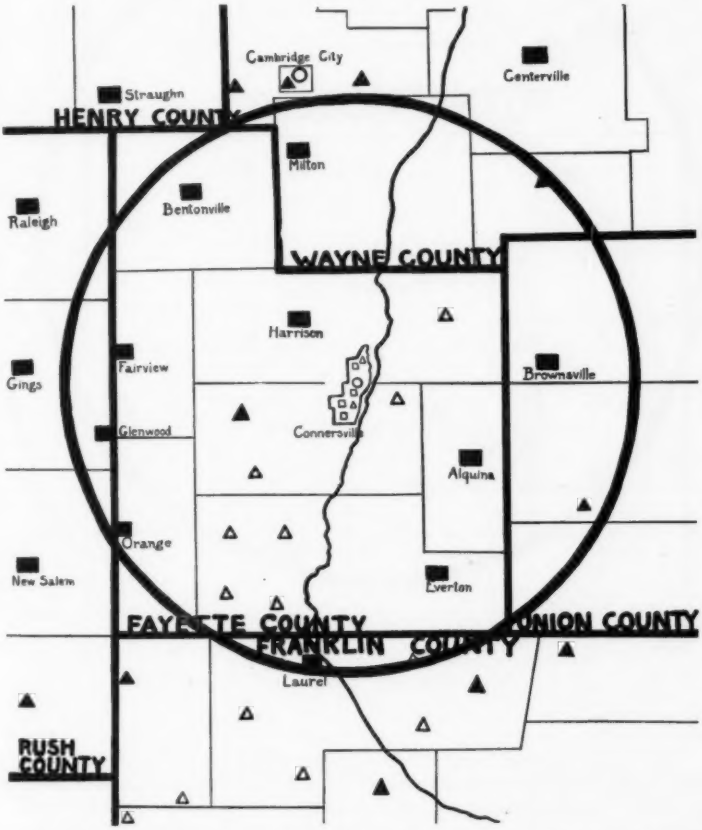

CHART 7. Location of the school buildings in Fayette County. The key is the same as that used in Chart 8.

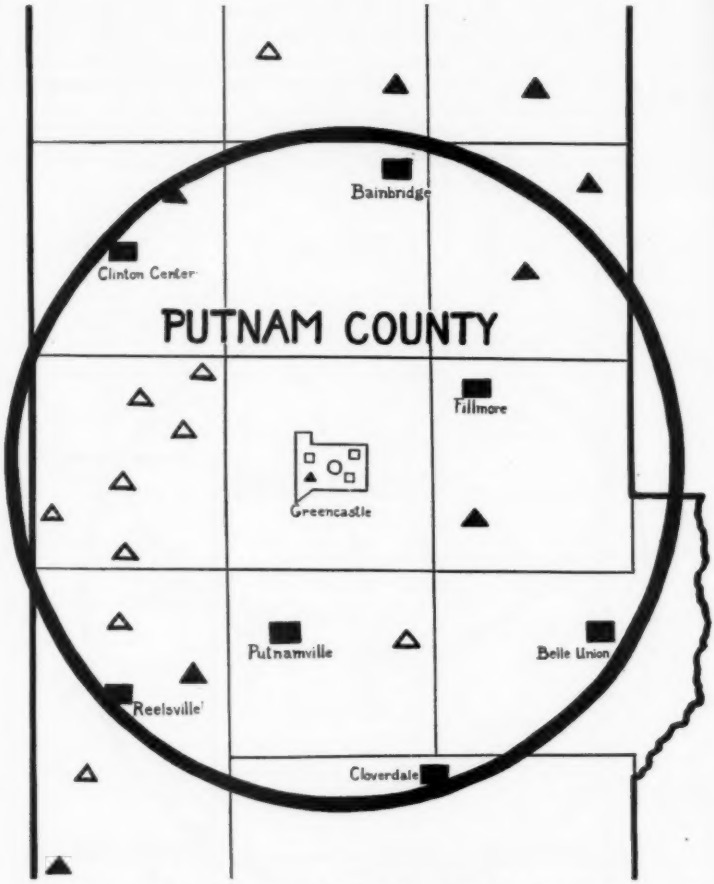

CHART 8. Location of the school buildings in a section of Putnam County. The circle has a radius of 10 miles and has its center in Greencastle. The key is the same as that used in Chart 3.

A similar situation exists in Putnam County, where Greencastle, with a high school building capacity of 800 pupils, houses only 615 pupils (Grades 7-12). The Clinton Center building has 43 pupils (Grades 9-12) enrolled and housed in a 1910 building which the county superintendent states should be replaced. The Putnamville building, a 1908 structure, has only 38 high school pupils (Grades 9-12) enrolled, and the Fillmore building, erected in 1910, houses 96 high school pupils (Grades 9-12). The Greencastle high school could easily accommodate the 177 additional pupils without the need for more building space. If a new building program should become necessary at Greencastle, the Bainbridge high school could be provided for there, as far as capacity of building is concerned.

That such wide consolidation of high schools is possible is attested to by the fact that consolidation is being carried out in some parts of the state. Martinsville, in Morgan County, serves a total of five townships so far as high school facilities are concerned.

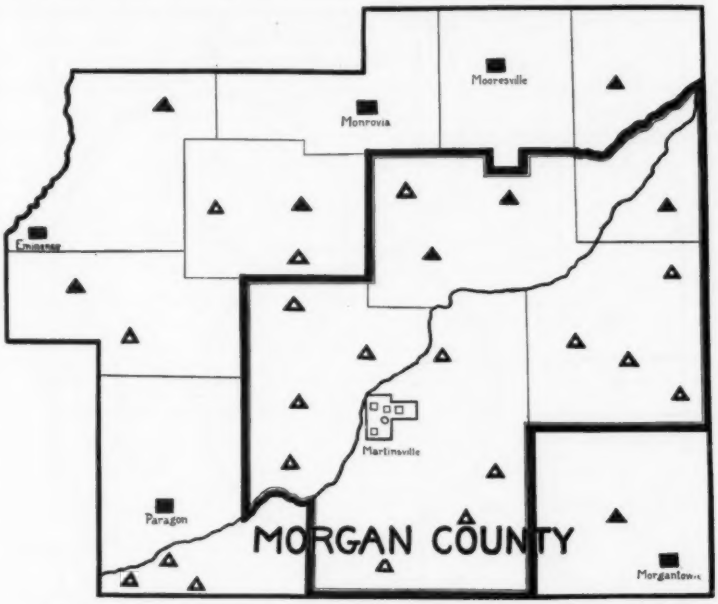

CHART 9. Location of the school buildings of Morgan County. The double line surrounds the portion of Morgan County served by the Martinsville high school. The key is the same as that used in Chart 3.

A further illustration of consolidation possibilities is Goshen in Elkhart County, where there are six elementary school buildings, with a combined capacity of 1,575, housing only 1,073 pupils. The city of Goshen could absorb the three large elementary schools just outside the corporation and four schools in the township to the west without overtaxing the capacities of the city buildings. The city already draws high school students from this elementary area and has an excess of high school capacity over enrollment of more than 100 students.

A peculiar situation exists in the southwest part of Elkhart County and the northwest part of Kosciusko County. Nappanee lies in the center of this district, and no fewer than 26 one-teacher schools, with a combined enrollment of 796 elementary school pupils, surround the town. Nappanee itself has 422 elementary pupils housed in two old buildings, one erected in 1878 and the other in 1899. Neither site is adequate, but the town owns two adequate sites. The region surrounding Nappanee is a very prosperous farming community with excellent roads.

There is no reason apparent why a new elementary building erected at this town could not provide for the 796 elementary pupils in the region, in addition to the 422 pupils in the town.

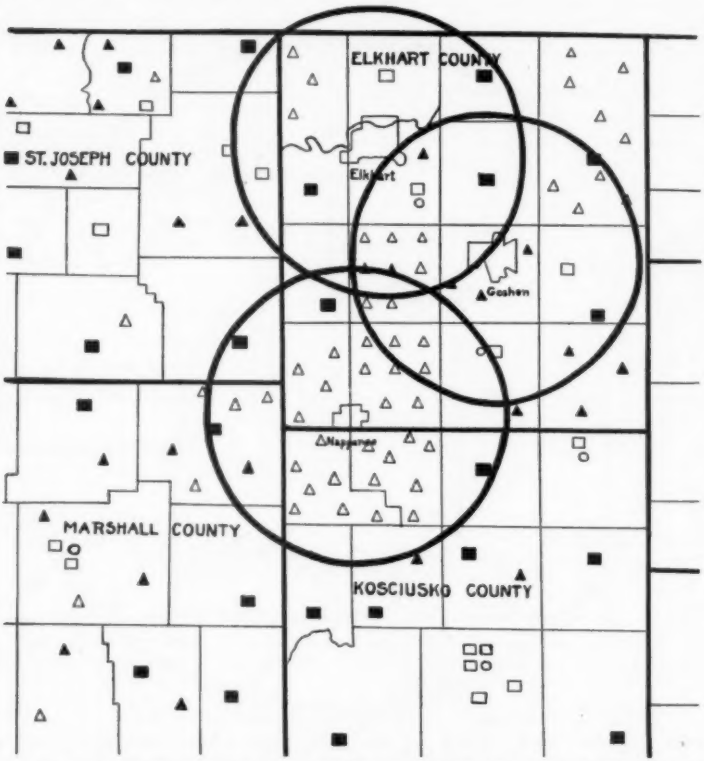

CHART 10. Location of the school buildings in Elkhart County and in adjacent portions of surrounding counties. The key is the same as that used in Chart 8.

The three circles on the map represent a 10-mile radius attendance area for Elkhart to the north, Nappanee to the south, and Goshen in between. These three centers could provide adequate schools, both elementary and secondary, for all of Elkhart County and portions of Kosciusko County to the south and of Marshall and St. Joseph counties to the west. The combined elementary enrollment of the 37 schools in the Elkhart region is 7,536, the combined high school enrollment is 2,384. For the Goshen region the combined enrollment of the 44 schools is 4,377 elementary pupils and 1,566 high school pupils. For the Nappanee region there are 3,446 elementary pupils and 1,228 high school pupils. Of course, there is considerable overlapping of these three areas, any adjustment of which would serve to reduce the enrollment of two or of all three centers.

While it is not presumed that such widespread consolidation could be effected in the near future, yet some such program and location of future centers could now be developed which would serve as a guide in future consolidation and as a guide in the abandonment of present buildings of the state. Such a program also would aid the school officials in the selected centers in the development of their building programs.

In conclusion may I add that the situations revealed by this brief study argue strongly for the development of some agency or channel for the more careful and thoro investigation of the possibilities of the more complete and economical utilization of present school plants and of economy in location, erection, and operation of future school buildings to be erected in our state.

Emergency in Education

DAVID E. WEGLEIN, Superintendent of Public Instruction, Department of Education, Baltimore, Maryland

I WANT to review with you some of the things which have been done by the Joint Commission on the Emergency in Education during the past year or so and then to indicate what the tentative plans are for the future. This Joint Commission came into being a little over a year ago. Our country is a vast one, and things do not happen simultaneously in all parts of the country. I remember that, when the crash came in 1929, there were some parts of the country that did not feel the effects of the oncoming depression so quickly as others did. There were some places in the Middle West that felt it perhaps ahead of any other part of the country. In my own city of Baltimore we did not feel it at once, and when certain places were complaining of their plight in education in 1930, I could not understand definitely how that could be because in my city 1930 was not so very bad. But we had our share, beginning in 1931, and it was worse in 1932. The Pacific Coast did not feel the depression as early as the rest of the country, since it took time for this wave to spread.

Things became so bad in 1932 that the major education associations began to be beseiged by educators in different parts of the country to do something about it. Appeals were made to the National Education Association, to the Department of Superintendence, and to other bodies to undertake something for the relief of the educational situation, and so the president of the Department of Superintendence and the president of the National Education Association appointed jointly a commission of seven people. The president of the Department of Superintendence appointed three superintendents; the president of the National Education Association appointed three individuals; and the two presidents together appointed the chairman, making seven. That Commission came into being at the beginning of 1933, a little over a year ago. The action of the two presidents was ratified by the Executive Committees of the two bodies at the meeting of the Department of Superintendence in Minneapolis in February.

Now the Joint Commission has been in existence a little over a year and it has been a busy year for that Commission. Everybody has been actively at work, and when, at the end of a year's activity, we made a résumé of the things that had been done, it really seemed that a great deal had been accomplished. I want to go over with you, briefly as I can, some of the things that this Joint Commission has brought about.

In the first place, these two bodies, the Department of Superintendence and the National Education Association, placed at the disposal of the Commission the headquarters staff in Washington, particularly the Research Division of the National Education Association, headed by Dr. Carr. The Commission had very little in the way of financial resources

at its disposal, but the services rendered by the headquarters staff have been estimated to be worth in money $100,000 a year. The first thing determined upon was to get the facts. The Research Division of the National Education Association at once got into communication with states and cities and other local districts thruout the country to find out just what the situation was in regard to education. Now, it doesn't take me long to tell you what was done, but anyone who realizes the complexity of our national situation, particularly in regard to education, will realize that it is something of a task itself to collect information as to all that is happening in different parts of the country, even in the local districts. It was not possible to get information from every place, but the major part has been done, and when you bring it all together, you get a fairly clear picture of what the situation is in regard to education in our country.

I am going to give you a few of the data right up to date as far as the Joint Commission has been able to compile the statistics. On the first of January, 1934, 2,600 schools had been closed. It was estimated that by April first, the beginning of this month, there would be 20,000 schools closed. Just picture that in itself—the closing of schools. The amount of money being spent this year, 1933-34, on education is $500,000,000 less than it was four years ago, 1929-30. The reductions in the school budgets of the several states ranged from 25 to 40 per cent. City school budgets averaged 20 per cent less for 1933-34 than they did in 1931. School building construction is 75 per cent less than in 1930—almost disappearing. Some public schools have gone on a tuition basis which means, of course, forcing out of school those children whose parents cannot afford to pay. We have in the high schools of this country this year 1,000,000 more pupils than in 1930. Now you can figure out for yourself how many more teachers that would require. But there are 40,000 fewer public school teachers this year than there were before an increase of a million children. Two hundred thousand teachers, that is, one out of every four in this country, are receiving less than $750 per annum in salary, if they receive anything, and that is less than the amount specified in the code for the wages of labor. Eighty-five thousand are receiving less than $450 per annum; 45,000 are receiving less than $300 per annum. You can figure out for yourself how people can live on a wage of that kind. Forty thousand teachers are owed $40,000,000 back pay not received.

Now, what about the kind of education that is being given, the quality of the service that is rendered. It is very dramatic to say that 2,600 schools are closed entirely and their pupils are without education, but that is not the whole story by any means—it is the diminution in the quality of education being given to practically all of the children in the country. In the first place, since the number of positions has been cut severely, classes have increased in size. I know in Baltimore we have been forced to drop many teaching positions and as a result some of the classes are so large that the instruction cannot be carried on efficiently. Instructional service has either been eliminated or curtailed in certain important divisions—kindergarten, music education, art education, playgrounds and recreational work, evening schools, adult classes, health

work. The amount provided for books and other educational supplies has been seriously decreased. For the whole country there has been a decrease of 30 per cent, but in some localities there has been more than 50, 60, or even 70 per cent diminution in furnishing the materials of instruction. Many counties report that rural teachers with lower qualifications are being employed or are displacing trained teachers.

Now these are some of the facts in regard to the situation at the present time. In some parts of this country the outlook for next year, 1934-35, is even worse. Since this is a vast country, there are some parts of it in which the outlook for education is better than it was before, but there are other parts of the country in which the future looks worse than the immediate past. You cannot go by this spot or that spot or some other spot. For example, we have suffered educationally in Baltimore just the same as other places have. We always have been a low-cost city in regard to education. The cost per pupil has for years been less than that of the cities of comparable size in the United States. Now, this was before the depression. So if we were a low-cost city before the depression, then any cuts that we have had during the depression will make the suffering even greater. Our 1932 budget of $10,000,000 was cut $800,000 as compared with 1931 and in 1933 it was cut $1,500,000. I am speaking of maintenance and operation. So, in two successive years we have had a cut of $2,300,000. Well, we succeeded in weathering that, and, altho we had a cut in 1933, dropped teachers, and curtailed practically every division, we did not curtail our curriculum. In spite of the cut of $1,500,000 we ended up the year with $325,000 unspent. This year, 1934, we have had an increase of $525,000 in our budget. Things look better than they did before, but you cannot say that that is an indication of what is going on in every part of the country. The outlook in some places is worse than the situation was last year.

The Joint Commission started in by getting the facts, and by making these facts known, as far as possible, everywhere in the country. The next thing that was done was to take steps to organize the educational people thruout the country, to make them aware of the situation, and to get their coöperation. Therefore, in every one of the forty-eight states a group of consultants was appointed, consisting of representatives of state teachers' associations, local associations, congresses of parents and teachers, and the educational press. Altogether, thruout the country about 800 educational consultants were appointed. Then a series of regional conferences was planned and held. We started in with Kansas City and Chicago. Then we had one in Cincinnati; one in Atlanta; one in Birmingham, one in Hartford; etc. We have held these conferences in different parts of the country so that the consultants from the states within the region represented would come together and spend their whole day, usually a Saturday, in going over the situation. One year ago tomorrow we were in Cincinnati for that day and met morning, afternoon, and evening. These consultants were also called together at the recent meeting of the Department of Superintendence in Cleveland. From the very beginning, the Commission decided to send out at intervals of every two weeks a news-letter to every one of these consultants, so that they would be acquainted with the information coming into the

office of the Commission. That effort resulted in success because it enabled us to reach out into every one of the states of the Union, and not only to acquaint these consultants who held key positions in their respective states, with the situation, but also to receive back from them information which was of value to the Commission in its work.

Another thing that the Commission undertook to do was to defend the principle of universal educational opportunity. There have been some people always opposed to universal educational opportunity, and the depression brought to the front an even greater number. One of the things we stand for in this country is democracy in education, equal opportunity for all children alike—no curtailment of educational opportunity; no doing away with the opportunity for every boy and every girl to go to high school if he desires. One of the greatest battles that has been waged is to get the public aroused to an understanding of that situation. In some places there has been a determined effort to break down that principle of universal educational opportunity, but I believe the whole situation in regard to education at the present time when compared to a year ago shows considerable improvement. The attitude of the public has changed toward education—where there was severe criticism a year ago, that criticism has diminished.

Of course, finance was one of the important things that the commission had to consider. It has been an important topic thruout the year. Last summer, 1933, a number of educators, economists, tax experts, and experts on finance were called together in New York City and were put to work in midsummer to study the question of finance intensively. The result of that study was the preparation of a report—*The Report of the National Committee on the Financing of Education.* No doubt a considerable number of you have seen that report. If the Commission had done nothing else during that year, that one thing would have justified its existence. That report has been used very widely in this country in helping formulate plans for the proper support of public education. Another thing that the Commission did was to authorize a series of nation-wide radio broadcasts, which received very favorable comment.

You probably know that certain publications of national circulation a year ago began to publish articles attacking education severely, in many cases unjustly and unfairly. The Joint Commission undertook to see that these publications were made aware of the unfairness of the articles that they were publishing, and I think a great deal has been accomplished. You do not see such articles being published any more, but in place of them you will find others being published which give the proper viewpoint toward education, a fair and just estimate of what education is and what it undertakes to do. Do not think these things have happened by chance. This change has been brought about by hard work done continuously. One of the things that the Commission undertook to do was to help superintendents and other administrators in acquainting the public with information considered vital in regard to education. A chapter in the 1934 *Yearbook* of the Department of Superintendence was prepared under the auspices of the Commission in an effort to help citizens to know their schools.

The Commission has undertaken to keep a record of those who have been attacking education unjustly and you would be surprised at the number of documents, articles, and other kinds of information that have been compiled in the offices of the Commission. These attacks have been followed up and the results in many cases have been very satisfactory because sometimes there have been retractions of what has been said or published; in other cases a modification has been made. At the close of 1933 representatives of a number of organizations were brought together in Washington, and these representatives were called a National Committee for Federal Emergency Aid in Education. I have indicated to you how bad the situation in this country is in regard to education. It was felt, and felt rightly, that in some parts of this country education could not be kept going unless the federal government stepped in and helped just the same as the federal government has helped in other connections, such as banks, agriculture, industries, and what not. This National Committee met a number of times. The Chairman was Superintendent Rule, of the State of Pennsylvania. As a result of the work of this committee, a recommendation for federal aid was prepared. This recommendation is called a six-step plan, and I will enumerate briefly those six steps or six points.

1. An appropriation of $50,000,000 to keep the schools of this country open during the present scholastic year ending in June, 1934.
2. An appropriation of $100,000,000 to keep the schools of this country open during the next scholastic year, 1934-35.
3. An additional substantial appropriation to be distributed to all the states for the year 1934-35 in order that educational institutions may be adequately supported. The amount embraced under that substantial sum is usually judged to be $300,000,000. One of the worst features about the educational situation has not been merely the closing of schools entirely, but, as I told you, it has been the diminution of educational work in the schools, where there has been a lowering of educational standards from year to year. These lowered standards will set back the work of our schools for years to come. The reason this situation is particularly bad is because it is not so evident. Schools are open but they are being run on a much lower standard than they were before over all the country and they will continue to drop lower and lower unless something is done to help them. This third step is intended for that purpose. May I say in passing that in every bit of the proposed federal aid for education there is absolute insistence in the recommendation that there should be no federal control of education, but that the control in education be left absolutely in the hands of the states and the local communities.
4. Federal government should release for school maintenance money that is tied up in closed banks; money that is due because of delinquent taxes; and money that is owed on account of school debts. In other words, the federal government should help to finance public education in the local communities in the same way

that it has advanced money to industry, banks, etc., to help them keep going.

5. Out of money for the appropriation for public works not less than 10 per cent should be allocated for buildings for schools, colleges, and other educational enterprises on whatever basis the money is loaned. Everyone advocates additional grants for public works, advocating a more liberal basis for the local community. Some recommend 100 per cent. This particular step recommends that not less than 10 per cent should be for educational institutions and schools.
6. An appropriation of $30,000,000 to be administered by the United States Office of Education to assist students to attend institutions of higher education.

Out of those six, something has already been accomplished in the granting of relief to keep schools open during the present scholastic year, and in helping to keep students in colleges and other institutions of higher education. The Educational Committee in Congress has also had hearings on the general educational situation looking toward doing something to assist along one of the other lines already enumerated. The Joint Commission helped the National Committee in formulating its plans and assisted in the preparation of the different data for the Congressional Committee hearing in February. Later the Joint Commission helped to secure the publication in a single volume, *Recent Social Trends*, a publication which is of value to all who are engaged in educational work.

The next thing done was to coöperate with the Phi Delta Kappa fraternity in preparing a pamphlet which would be helpful in carrying on local discussions in regard to educational procedure. This pamphlet, which has been published, is called *Evaluating the Public Schools*. I dare say many of you have seen it. When such a publication was first proposed, there was considerable doubt among some as to its advisability, but the majority thought, and I believe thought properly, that the only way to get the public to support education more adequately was to get the public to understand what the educational situation really is. Therefore, in this pamphlet there were proposed for discussion such vital questions as "At what age should public education begin?" "At what age should it stop?". Similar questions of a vital nature were asked in considering the support of public education.

As for future plans, the Joint Commission has had several meetings in recent months looking toward the next step. At the last meeting of the Executive Committee of the Department of Superintendence in Cleveland at the end of February both the Executive Committee of that Department and the Executive Committee of the National Education Association voted that the Joint Commission was to continue. However, the name of the Commission may be modified somewhat and its membership may be somewhat increased.

This is what the Joint Commission is thinking about for the coming year. These are tentative plans only. It is felt by the Commission that during the year 1933 the educational people thruout the country

have been informed of the situation and aroused to the danger confronting education. They have also been made acquainted in a somewhat satisfactory way with the necessity for planning for proper support of education as evidenced in the publication, *The Report of the National Committee on the Financing of Education.*

The Joint Commission thinks the next step is not merely one of studying the financial situation but also that of taking steps toward appraising public education and planning for educational recovery and reconstruction. Without doubt what we have been doing in education has not been in every respect what it should have been. The public has been critical, in some cases rightly so, and the first thing for those of us who are engaged in educational work to do, is to take stock and evaluate just what we are doing, appraising it to see what it is and in what ways it is falling short of what it should be doing. This is a huge undertaking.

The Commission believes the next thing to do is to plan to recover the ground which has been lost during the depression and then to plan for educational reconstruction, if we may call it such; i.e., to formulate plans to bring education into harmony with the great changes—social, economic, and financial—that are taking place in our country.

How is this going to be done? Is this small Commission going to undertake such a gigantic task all by itself? No. It does not plan anything of that kind, but what it would like to do is to coördinate all the different agencies that are working along lines that will fall within the scope of what I have indicated. Already the Commission has had a study made of the national committees and organizations that are now or have been in the immediate past undertaking the study of these new problems. There are 150 national commissions, committees, and other bodies that are carrying on worth-while studies in the field. It will be the purpose of this Joint Commission in the future to try to coördinate the work of these different bodies and to formulate a national plan for educational appraisal, recovery, and reconstruction. We have had prepared a list of these national organizations and committees and what they are doing. The pamphlet is quite a formidable looking one—just the list of them. We have also had prepared the issues that are being studied by these 150 organizations, and these issues fall into about ten major categories. The Joint Commission would like to bring together all these different agencies, get them to coöperate toward a general purpose, a national plan. Where there is no agency at the present time working in a field which ought to be investigated, the Commission would like to stimulate some organization to undertake the study of that particular project. So that, during the coming year, the purpose of the Commission would be to be a national planning body to bring together the efforts of all the national organizations working toward this common purpose, and to bring into being, wherever necessary, committees or commissions to undertake the study of those things which have not yet been investigated. You can see that what lies ahead is infinitely greater in complexity and scope than what was done during the past year. But if education in this country is to progress, it must go ahead on a good, solid, qualitative basis. That is the reason the Commission thinks that

during the next year or so our efforts should not be confined merely to studying the financial problem, but should concern some things much more vital. Among these are the whole question of properly training teachers and the coördination of supply and demand—problems that are huge and national in scope.

Another problem that lies ahead is the reorganization of the local unit of administration, not merely in education but in government in general. In some parts of this country there is a tremendous waste in the amount of overhead spent on the multiplicity of small local governmental units. The political scientists have seen that, and they are formulating plans and making studies of how the local unit of government can be better established. We think the local unit in education for school administration should be coördinated with the local unit for general governmental purposes. The subject should be studied by political scientists on the one hand and by those engaged in education on the other.

The value of the questions I have mentioned has been proved when it comes to real educational procedure. We do not want merely to study how we can finance education. We want to study also how to coördinate local support, state support, and federal support. The thing that I would like to emphasize to you is this: that the work of the Commission in the future is going to be along the lines that I have indicated; namely, we are going to try to study and plan the appraisal of education and take steps toward the recovery and reconstruction of educational work in this country.

School Finance in Indiana

R. W. HOLMSTEDT, Associate Professor of Education, Indiana University

FINANCE continues to be the most pressing problem confronting public school officials in Indiana. While the schools of Indiana have not been reduced to the critical status of the schools in several other states, we are not yet in a financial position to meet the educational needs of the pupils in an adequate manner. The legislature of 1933, under the leadership of Governor Paul V. McNutt, enacted the school support laws which have made it possible for all of the schools of Indiana to remain open this year. In these measures the state has recognized and assumed its responsibility in the support of public schools. The foundation of a modern system of school support has been laid. Few states can offer comparable achievements. But the task is not finished by any means. Much remains to be done to guarantee adequate educational opportunity to the school children and justice to the taxpayer.

As a basis for discussion I would like to summarize the trends in school finance in Indiana. Data on school costs for the past five years are presented in Table I. The peak in school costs occurred in 1930-31, when the current operating expense totaled $55,246,419. The current operating expense in 1932-33 was $44,705,850, a reduction of 19 per cent in two years. Estimates of school costs for the current year are 10 per cent less than costs of last year, which would bring the total current operating expenses down to approximately $40,000,000, which is a reduction of more than 25 per cent from 1930-31. During the period from 1931 to 1933 local taxes collected for schools decreased from $56,214,933 to $41,768,325. Revenues from local school taxes for the current year are estimated to total from $30,000,000 to $35,000,000. However, state funds will increase the total revenues sufficiently to meet the school expenses of this year.

TABLE I. TRENDS IN SCHOOL COSTS IN INDIANA, 1929-34

School Year	Current Operating Expense*	Payments on Bonded Indebtedness
1929-30	$54,882,591	$5,027,813
1930-31	55,246,419	5,136,012
1931-32	51,799,682	5,328,800
1932-33	44,705,850	4,436,366
1933 34	40,000,000†	5,000,000†

*Debt service, capital outlay, and transfer tuition are not included in these totals.
†Estimates.

Since 1931 the funds available for public education in Indiana have been reduced to a sum which is at least $5,000,000 less than the amount spent for schools ten years ago. But there are 72,000 more pupils enrolled in the schools at the present time than there were in 1924. Sixty thousand of these additional pupils are enrolled in the high schools of the state. The demand for education as measured in numbers of pupils to be educated has increased about 12 per cent in ten years; the money available for education has decreased 10 per cent in the same period.

The effect of diminishing school revenues is reflected in curtailed educational opportunities for the pupil. A recent report of the State Department of Public Instruction shows that the number of high schools offering home economics in 1932-33 was 114 less than in 1930-31; the number offering agriculture, 65 less; the number offering industrial arts, 31 less; the number offering band and orchestra, 46 less; the number offering vocal music, 133 less; and the number offering art, 141 less. The number of high schools offering commerce and physical education increased 34 and 50 respectively, from 1930 to 1933. Music, art, physical education, and kindergarten classes have been eliminated quite generally from the elementary schools. These special subjects have been termed "fads and frills" by many people, but they are a vital part of the school curriculum. To eliminate them means that thousands of boys and girls are being denied some of the most important elements in education.

Teachers have borne the burden of the reduction in school costs. The number employed in 1933-34 is over 2,000 less than the number employed in 1930-31. The teaching load has been increased more than 10 per cent, while salaries have been reduced about 25 per cent. Sixty per cent of the reduction in school costs has come from teachers' salaries. Further reductions in school budgets must come largely from instructional service. The result will be an inadequate, underpaid teaching staff confronted with an ever-increasing educational task.

The physical facilities of the schools have deteriorated to a marked degree during the depression. Practically no new school buildings have been erected. Expenditures for equipment have been reduced to a minimum. Less than one-half as much money was spent for repairs in 1932-33 as in 1930-31. School supplies have been curtailed far below the requirements of an adequate school program. While some improvements have been secured thru federal aid projects, the physical facilities of Indiana schools are becoming increasingly inadequate for the demands of the educational program. Neglect of buildings and equipment for any extended period of time can only result in an added burden in the future. In the meantime teachers and pupils are seriously handicapped in their work.

While the citizens of Indiana have been more fortunate than people of other states wherein thousands of children are deprived of schooling of any sort, the fact remains that schools in Indiana have been crippled; that many pupils are being denied desirable educational activities; that teachers are overworked and underpaid; and that, while the need for education is greater than at any other period in history, the money available for school support is a continually decreasing sum.

However, significant advances have been made in school finance in Indiana even tho our schools are in a critical condition. As mentioned previously, the foundations of a system of state school support have been laid. The first steps toward the constructive revision of the taxing system have been taken.

The effect of the school support laws enacted by the legislature of 1933 is shown in Table II. In 1930-31, $4,957,471 was apportioned to the schools from state funds. This amounted to 8 per cent of the total revenue receipts for that year. A conservative estimate of the amounts to be received from the state for the current year totals approximately $15,000,000. This amount is 32 per cent of the estimated revenue receipts of the school corporations for 1933-34.

TABLE II. SOURCES OF SCHOOL REVENUE RECEIPTS IN INDIANA, 1929-34

Year	Local Taxes		State Funds		Other Sources	
	Amount	Per Cent	Amount	Per Cent	Amount	Per Cent
1929–30...	$56,384,553	91.1	$4,579,763	7.4	$892,748	1.5
1930–31...	56,214,933	90.4	4,957,471	8.0	874,011	1.6
1931–32...	52,613,730	88.4	6,025,018	10.2	856,527	1.4
1932–33...	42,273,278	88.0	4,548,430	9.5	1,234,238	2.5
1933–34...	32,000,000*	67.0	15,000,000*	32.0	1,000,000*	1.0

*Estimates.

Estimated receipts from the gross income and excise taxes are approximately $10,000,000. This makes possible a reduction of nearly 25 per cent in local school tax levies. We have here a significant illustration of the function of state school support in the development of a modern system of taxation. Revenues secured from new tax sources and distributed to public schools immediately become available for local property tax relief. State government, schools, and roads have proved to be the most satisfactory media for shifting the tax burden from property. Local levies constitute the chief burden of taxation, and schools represent the largest single item in local tax levies. It is obvious that increased state revenue for schools secured from sources other than property taxes promises to be the most satisfactory method of equalizing the tax burden.

Another important development in school finance in Indiana has occurred in state school relief. The reduction of the qualifying rate to 50 cents per $100 assessed valuation permits the corporations of low wealth to provide a minimum school program at a nominal local tax rate. Nearly 600 school corporations in Indiana have qualified for state school relief in 1933-34. A study of a number of school corporations applying for school relief shows that these corporations have not reduced their school budgets proportionately as much as other school corporations and that the reduction in local school tax levies was nearly twice as great as in corporations not applying for school relief. The significance of the

school relief fund in school support in Indiana is obvious. The chief problems in this connection are the maintenance of satisfactory educational standards in state relief schools and the insurance of adequate funds to meet the claims of the qualifying corporations.

There is no evidence that the limitation of total tax rates to $1 in the townships and $1.50 in the cities is a practical method of financing public enterprises. Those units which stayed within the $1.50 limit for 1933 have found it necessary to increase their tax levies for 1934 by substantial amounts. Furthermore, the financial condition of the units of government which reduced their tax rates to $1.50 is considerably worse than the condition of those units which did not reduce taxes so drastically. The average property tax rate in Indiana for 1934 is approximately $2.50. The average school tax rate is between 80 cents and 90 cents. In view of the fact that all functions of government have suffered from severe reductions in revenues, it is evident that the $1 and $1.50 limitations cannot be enforced unless revenues from sources other than property taxes are greatly increased.

The evidence presented thus far indicates that the school corporations of Indiana will close the present year in better financial condition than a year ago. Altho school funds have been exhausted in a number of instances and many school corporations are severely handicapped by losses in bank failures, if economic conditions continue to improve our schools will eventually be on a sound financial basis.

However, the battle for adequate school support is not won by any means. Raids on school budgets will continue. We may expect that our system of state school support will be assailed in the legislature of 1935 by many powerful interests. Indeed, we may consider ourselves fortunate if our present advances are preserved.

The most important task confronting the school people of Indiana is the maintenance of our school program. Further reductions in school support will only result in added curtailment of the educational program, which is now far below a satisfactory minimum as measured in terms of pupil needs. Teachers' salaries must not be subjected to further reduction in the face of rising costs of living. The curriculum must be preserved from further limitations. Improvements in our tax system cannot be lost. Every friendly interest must be rallied to the support of the public schools, in order that the children of this state shall not suffer further denial of educational opportunity.

But this is not all. Our public school system has never been equal to the educational task imposed upon it. The present need for expanded educational facilities has been emphasized on every hand. Fundamental changes in organization, control, and support are needed to enable the schools to serve their function in our present economic and social order. We have lost ten years in educational progress, but the need for knowledge and training continues to grow daily.

Perhaps the most important factor which should receive attention from educators in taxation. Our schools can be no better than the tax system by which they are supported. The gross income, excise, and intangibles taxes are significant improvements in taxation, but they are only a beginning. Property still pays the tax bill. As long as schools

must compete with other governmental services for the limited revenues from an overloaded property tax, that long will education be starved. We have had ample demonstration that property taxes are inequitable and inadequate, but it does not follow that the people of Indiana cannot afford education and other desirable governmental services. There is little evidence that taxes which are used to support desirable public enterprises reduce public income or destroy wealth if the taxes are levied equitably and spent efficiently. While it is important that tax revenues be sufficient for governmental needs, educators cannot ignore the fact that they are the greatest tax spenders and as such they must consider the taxpayer. An equitable tax which places an unjust burden on individuals or groups cannot be defended, even tho the proceeds are used for education. If we shirk our responsibility in the development of a sound system of taxation, we may expect that schools will not receive financial support commensurate with their social importance. At the present time there is a strong attack being made on the new sources of taxation. These forces must be opposed, not only in the interest of schools but also in the interest of taxpayers. If the present gains are lost, our whole system of public finance will be endangered and all public services will suffer. Our only insurance is a system of taxation based on ability to pay and administered efficiently.

A second element to which educators should devote attention is the reorganization of government in the interests of economy and efficiency. Much has been said about governmental economy, but so far it has consisted mainly of reducing the budgets of the various agencies. Nothing of any consequence has been accomplished to date in reorganizing our governmental units. We complain about the high cost of city, county, and township government but do little or nothing to change the units to more efficient types of organization. Taxes which are spent for unnecessary officials or become the spoils of politics mean just that much less money for schools and other needed social services.

It is well to remember in this connection that there is need for constructive reorganization of school units. It is hardly fitting that educators criticize other governmental agencies on the grounds of inefficient and uneconomical organization when they permit our rural school units to continue to be educationally inefficient, poorly administered, and financially expensive. The state's recognition and acceptance of its financial responsibility for public education should impress upon us the fact that education is not the sole affair of the local unit, the local school, or the individual teacher, but is the concern of the state as a whole. The best system of state school support that could be devised would not produce maximum educational returns as long as the local unit which receives the money remains inefficient and uneconomical. When school support is entirely a responsibility of the locality, economy and efficiency may be the concern of each individual community. When school support is assumed by the state, the wealthy localities which furnish the funds for poor communities can hardly afford to ignore the efficiency with which the money is spent. Every dollar wasted because of the existence of

inefficient and uneconomical school units is just that much education lost. When the need is so great, every dollar spent for education must bring in the greatest returns.

Finally, there is need for improvement in the administration of school funds. The state tuition law is indefinite as to the amount which shall be available for public schools. It will be difficult for local officials to make accurate estimates of school revenues unless they can be certain of definite amounts from the state. If it becomes necessary to change local tax levies in order to adjust to fluctuating state funds, the school will suffer in consequence. It would be highly desirable to make the sum allotted per teacher a fixed amount and mandatory upon the state. If the amount were increased to $600 per teacher and definitely set at that figure, the problem of local budget making would be simplified considerably.

The same criticism applies to the school relief fund. Since nearly 600 corporations have applied for school relief, this fund is of much greater importance than it has been in the past. In its present form the school relief law is quite indefinite as to the amounts which the corporation may receive and the rate which must be levied to qualify. Likewise the money available for relief purposes is a fixed amount while the demands may fluctuate. It is of paramount importance that this fund be protected from deficits and the qualifying rate kept at a low figure.

The administration of the school relief fund has never been satisfactory, altho improvements have been made in recent years. There is no good argument for reimbursement as it now operates. If budgets are approved on reasonable standards there is no good reason why the funds should not be apportioned during the school year at the time other funds are distributed. The necessity of borrowing or incurring deficits by local officials would be reduced considerably by such a scheme and little or nothing would be lost so far as the state is concerned.

In the past, school relief has been looked upon as a type of charity to be doled out to poverty-stricken districts. It is now a significant part of school support in Indiana. More equalization of educational opportunity and tax burden can be secured from a given amount of money distributed thru this fund than from any other method of school support in operation in the state. It is essential that the relief fund be maintained at its present level, protected from deficits and administered in the interests of the local corporation. If satisfactory schools can be maintained on a local tax rate of 50 cents, no community need be burdened with school taxes or suffer lack of educational facilities. The combination of state tuition support and state school relief, if maintained and improved, will eventually provide Indiana with a system of school support equal to any now in force in any other state.

What the Ordinary Objective Test Measures

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THE objective test has, at least apparently, come to stay. It has stood the test of time. Since the beginning of the present century it has obtained in one form or another.[1] It has survived the ill effects of malpractice; doubt, negative criticism, and active opposition have actually contributed largely to its development.[2] Its use, at least in the more progressive schools, has become almost a matter of routine.[3]

Moreover, as educational measuring devices go, it would seem[4] this device deserves superior status. It is practically impartial in its measurements, as the subjective judgment of the examiner is largely minimized. It is very definite as to requirements since the possibilities in the direction of response are specifically indicated. It is relatively comprehensive as to sampling; the different aspects of the given content are ordinarily fairly well represented.

Indeed, in point of demonstrated fact, the objective test is considerably more reliable than the older, traditional essay and discussion examinations;[5] and all the experimental evidence available points to the fact that it is not any more narrow or specific in the functions measured.[6]

But, generally sound as it is in theoretical principle and well established as it is in actual practice, the objective test is open to criticism. Its validity, apart from the fact that it is fairly consistent in its measurements, is largely a matter of assumption. What it actually measures either directly or indirectly, or both, has not been determined.

Thus it is that, for the time being, I choose to join the test critic and examine the objective test. But my purpose is not to discredit this device. Rather, I only hope that I may stimulate study and research directed toward its improvement.

The question is: What does the ordinary objective test measure?

[1] Early in the present century the objective test was introduced as a standardized test, i.e., a test with highly refined content and norms. Then, after a more or less brief period of almost "faddism," another form of this device, namely the ordinary or teacher-constructed test, emerged. And latterly, the formal or semi-standardized test has appeared on the scene.

Odell, C. W., *Traditional Examinations and New-Type Tests*, Chapter I, The Century Co., New York, 1928; Ruch, G. M., *The Objective or New-Type Examination*, Chapter I, Scott-Foresman, Chicago, 1929; Lang, A. R., *Modern Methods in Written Examinations*, Chapters I, IV, and V, Houghton Mifflin, Boston, 1930; Jones, V. and Neet, C., "Educational Tests," *Psychological Bulletin* 30:518-31, July, 1933.

[2] Ruch, G. M. and Stoddard, G. D., *Tests and Measurements in High School Instruction*, Chapter I, World Book Co., New York, 1927; Wood, B. D., *Measurement in Higher Education*, Chapter I, World Book Co., New York, 1923.

[3] Ruch, *op. cit.*, Preface, and Chapter I.

[4] Odell, *op. cit.*, p. 183ff; Ruch, *op. cit.*, p. 112ff; and Lang, *op. cit.*, p. 90ff.

[5] Ruch, *op. cit.*, Chapter XI.

[6] Ruch, *loc. cit.*

Theoretical Considerations

The objective test, whether it be ordinary, formal, or standardized, is essentially a controlled association test. It consists of a rather imposing series of more or less unrelated stimulus-items, with the range of response for each limited to two or at most a few very specific possibilities. And, as such, it would seem that its measurement would be limited to such functions as immediate recall and recognition.

This device is necessarily piecemeal in its measurements. Like "the little boy's dictionary," it "changes the subject too often" for any kind of thinking except the occurrence of temporarily short and more or less distinctly different "impressions." Continuous thinking in any one of the several directions ordinarily indicated would prove fatal in point of scoring. Thus it would seem that a score on such a test would represent such functions as immediate recall, recognition, "flashes of insight," and "guess."

The ordinary objective test is very deceiving in point of construction. That is, the construction of such a test, whether in prospect or in process, seems easy but is actually very difficult.[7] It is easy enough—only time-consuming—to formulate such a test by copying statements from the textbook or other printed sources. But it is an entirely different matter to give the different concepts a new contextual setting. It appears, therefore, that more than likely the ordinary objective test is more or less unwittingly designed to measure rote memory.

This test is scored in terms of arbitrarily defined units. The teacher or instructor decides, once for all, the correct answers to the different items; and this decision stands as the key for scoring the given test. Now, is it not just possible that this procedure, if not very carefully done, may contribute to the measurement of an undue amount of what, for want of a better name, may be called misinformation? Moreover, even after the correctness or incorrectness of the different items has been determined, certain parts of the test (especially the true-false section) are, as a rule, corrected for guessing; and, what is more, the correction is done by means of an arbitrarily defined formula.[8] Accordingly, it would seem that this procedure would determine a total score that consists of at least an element of "guess" together with "knowledge" that has perhaps been reduced somewhat by "overcorrection."

The average reliability coefficient for even the standardized form of the objective test is only approximately .75.[9] This reliability is only .15 above the minimum statistical requirement generally accepted as valid for group comparison; and it is actually .15 below the minimum require-

[7] Ruch, G. M., *The Improvement of the Written Examination*, Scott-Foresman, Chicago, 1924; Paterson, D. G., *Preparation and Use of New-Type Examinations*, World Book Co., New York, 1925; Bayless, E. E., "Testing for Comprehension," *Journal of Educational Research* 20:268-72, November, 1929; and Gerberich, J. R., "A Technique for Measuring the Ability to Evaluate Objective Test Items," *Journal of Educational Research* 27:46-50, September, 1933.

[8] The formula generally used in correcting for "guessing" is:

$$\text{Score} = \text{No. Right} - \frac{\text{No. Wrong}}{(N-1)},$$

where N represents the number of possible responses. Ruch, G. M., *The Objective or New-Type Examination*, p. 332.

[9] Ruch, G. M., *The Objective or New-Type Examination*, p. 143-4.

ment for validity in individual analysis.[10] These facts indicate that the ordinary or teacher-constructed test—which is, as a matter of course, not carried thru all of the stages of refinement required for standardization—may not measure any one set of functions any too consistently. Comparable forms of such a device would not, in all probability, overlap even as much as 50 per cent in the functions measured; and a single form administered at different times would not measure the same functions, from one time to the next, to any considerably greater extent.[11]

But all of these arguments are more or less general. That is, most of them could be directed at any of the different types of tests and examinations; and even those that are specific for the objective test have their parallels and corollaries for the other types of tests and examinations. What is needed in this connection is a large amount of experimentally determined facts.

Some Experimental Data

In an attempt to get at what the ordinary objective test measures, such a test was given to three classes (95 sophomore, junior, and senior college students) in a course in general psychology.[12] The conditions were standard. The test was one of the periodical tests for the course. Therefore the students were normally motivated for it. The classroom conditions were normal. The test was given in two forms, a different form for alternate rows of students.

The ordinary directions were modified to include the following specific instructions: "Answer the questions as directed in the test; and, at the same time, mark your answers as follows: + , if and when you are absolutely sure your answer is correct; ? , if and when you are in doubt but believe your answer to be correct; √ , if and when your answer is a mere guess. If and when you decide to leave a question unanswered, place a minus sign (—) before it."

These special instructions were given under threat of penalty. The warning was as follows: "Questions and answers not marked as thus directed will be scored as *wrong*. Also you will be penalized for inconsistencies, i.e., if your answer in any given case is wrong while your mark indicates that you are positive it is right, etc." To be sure, this threat was largely bluff, but it seemed to work.

In order to establish a validating measure for the results thus obtained, a second test (the next periodical test for the course) was given under the same conditions. The results obtained in this experiment are presented in Tables I, II, and III.

Table I shows how the items in the first test were marked. Here the results are presented for the average individual in the group. It is interesting to note that, according to these data, the average student answered 48 per cent of the items with certainty, 32 per cent with doubt,

[10] Almost any textbook in the field of educational statistics for the statistical requirements referred to here.

[11] The error of prediction is ordinarily determined by the formula $\sigma\sqrt{1-r^2}$; and the reliability coefficient for a given test is in general not much greater than the correlation between comparable forms of the same test.

[12] This experiment was done in the Department of Education, Purdue University.

and 13 per cent by guessing, while he left 7 per cent of them unanswered. It is interesting to note also that, of the three types of items, (1) he was less certain about his answers for the matching type, (2) he tended to guess more in the cases of the matching and multiple-choice types, and (3) he left more of the matching type unanswered.

TABLE I. MARKS GIVEN ON THE ITEMS OF AN ORDINARY OBJECTIVE TEST

Items	Marks*							
	+		?		√		—	
	No.	%	No.	%	No.	%	No.	%
True-False.....(75)	39	52	25	33	8	11	3	4
Matching.....(24)	8	33	7	29	4	17	5	21
Multiple-Choice.....(11)	6	55	3	27	2	18	0	0
Entire Test.....(110)	53	48	35	32	14	13	8	7

*Key: +, answered with certainty.
?, answered with doubt.
√, guessed at.
—, left unanswered.
No., average number of items for an *N* of ninety-five.
%, number divided by the total number of items involved in each case.

Table II shows the extent to which the students were successful in the test. Here again the results are presented for the average student in the group. The data indicate the extent of correctness and incorrectness in the responses to the different items and to the total test.

It will be observed from these data that the average student was not any too successful in answering the items in the test. Of the true-false items answered with certainty he missed 18 per cent; of those answered with doubt, he missed 28 per cent; of those guessed at, he missed 40 per cent; and he left 4 per cent unanswered (see Table I). Of the matching items answered with certainty, he missed 38 per cent; of those answered with doubt, he missed 43 per cent; of those guessed at, he missed 50 per cent; and he left 21 per cent unanswered (see Table I). Of the multiple-choice items answered with certainty, he missed 33 per cent; of those answered with doubt, he missed 33 per cent; of those guessed at, he missed 50 per cent; and he left none unanswered (see Table I). In all of the items answered with certainty, the average student missed 23 per cent; in all of the items answered with doubt, he missed 31 per cent; in all of the items guessed at, he missed 43 per cent; and, in all, he left 7 per cent unanswered (see Table I).

TABLE II. THE CORRECTNESS AND INCORRECTNESS OF THE ANSWERS MARKED AS INDICATED IN TABLE I

Items	Marks*											
	+				?				✓			
	Correct		Incorrect		Correct		Incorrect		Correct		Incorrect	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
True-False	32	82	7	18	18	72	7	28	5	60	3	40
Matching	5	62	3	38	4	57	3	43	2	50	2	50
Multiple-Choice	4	67	2	33	2	67	1	33	1	50	1	50
Entire Test	41	77	12	23	24	69	11	31	8	57	6	43

*Same as footnote in Table I.

With his test scored in the usual way, i.e., by the R-W method of correcting for "guessing" in the case of the true-false items and with no correction made for "guessing" in the other two cases, the average student made a score of 56 out of a possible 110 on the whole test. Comparison of these results with the results obtained on the test used for validating purposes indicates that the measurement from one test to another tends to be consistent.

TABLE III. MARKS GIVEN ON THE ITEMS OF THE SECOND TEST

Items	Marks*							
	+		?		✓		—	
	No.	%	No.	%	No.	%	No.	%
Entire Test (55)	28	51	19	35	5	9	3	5

*Same as footnote in Table I.

TABLE IV. THE CORRECTNESS AND INCORRECTNESS OF THE ANSWERS MARKED AS INDICATED IN TABLE III

Items	Marks*											
	+				?				✓			
	Correct		Incorrect		Correct		Incorrect		Correct		Incorrect	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Entire Test	20	71	8	29	12	63	7	37	3	60	2	40

*Same as footnote in Table I.

The results for the test used as a validating criterion are presented in Tables III and IV. These results are presented in summary for the average individual in the group.

In this case, the average student in the group answered 51 per cent of the items with certainty and 35 per cent with doubt. He guessed at 9 per cent of the items and left 5 per cent of them unanswered. Of those he answered with certainty, he missed 29 per cent; of those he answered with doubt, he missed 37 per cent; and of those he guessed at, he missed 40 per cent.

The correlation between answering with certainty on the first test and answering with certainty on the second test was found to be .61; between answering with doubt on the first test and answering with doubt on the second test, .78; and between guessing on the first test and guessing on the second test, .75. The reliability of the first test proved to be .71, and that of the second test .57.

It appears, therefore, (1) that the ordinary objective test may tend to measure a complex of such factors as specific knowledge, doubtful impression, misinformation, and "guess," and (2) that it may measure these factors equally reliably, tho not to the same extent.[13] Certainly these conclusions hold true in the present case.

But, of course, the data presented here are hardly subject to generalization. Only two samples of the objective test were investigated; and these were administered to only a relatively small sampling of the student population. Also, the fundamental assumption, namely, that a student knows and can report his states of mind under conditions of "rapid fire," may not be any too well-founded.

As a matter of fact, the present experiment serves to emphasize, more than anything else, the need for research in the validation of the objective test. Also, it may serve as a possible approach to some of the problems involved.

Conclusion

Now, the theoretical considerations and the data presented here do not, by any means, satisfy the central question. What the objective test measures is still a matter of opinion; and only a large amount of systematic experimentation can finally settle the issues involved. Moreover, the test critic and the test advocate should be interested alike in determining the necessary facts.

In point of purpose, the arguments and the data offered here should suggest specific problems for investigation. The argument that the objective test is essentially a controlled association test and that therefore it would seem to measure such things as immediate recall and recognition should indicate the possibility of evaluating the ordinary objective test in comparison with the essay test scored objectively. This procedure would determine the extent to which the results of controlled and more or less free association represent the same functions.

[13] The score on such a test would seem to represent knowledge more than anything else, with doubtful impression running second, but not too close.

The argument that the objective test is necessarily piecemeal in its measurement should suggest the possibility of investigating the objective test as a miscellaneous array of items in comparison with itself as a logical organization, i.e., with the facts or items grouped according to topic. Investigation in this direction should show the extent to which "flashlike" thinking and more or less continuous thinking in a given direction yield the same results.

The argument that the ordinary objective test is more or less unwittingly designed to measure rote memory should suggest the investigation of the methods and procedures ordinarily followed in the construction of such a test. This argument should also suggest the investigation of the problem of the functions represented in rote memory as compared with the functions represented in logical memory. Furthermore, it should suggest the investigation of the ability on the part of teachers and instructors to judge the merit of objective test items.

The argument that the arbitrary manner in which the objective test is scored contributes to the measurement of misinformation and "guess" should suggest experimentation directed toward the evaluation of the different methods of scoring the test. An experimentally determined formula rather than an arbitrarily determined one is needed, especially in correcting for "guess"; and it may be that the formula should be extended to include correction for misinformation and doubtful impression.

The argument that the objective test may not measure any one set of facts any too consistently should suggest the investigation of the objective test in this direction, together with possible means and methods of supplementing this device for more valid measurement.

The data serve to emphasize the problems stated above and, at the same time, suggest interesting possibilities in the use of the ordinary objective test for the measurement of things other than scholastic achievement.

Tests and Measurements in School Systems

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WHAT I am going to speak to you about is the use of a testing program in the administration, supervision, and instruction in a school system.

We have had such a testing program in Baltimore for over ten years, using standardized objective tests. We were pioneers in establishing what you might call a bureau of statistics. Over twenty years ago we appointed a statistician in our school system and, according to all accounts that I have been able to find, that was the first position of the kind in any city school system in the country. We were particularly fortunate in getting a man for that position who, because he had had many years of experience as a principal in the school system, combined knowledge of statistics with knowledge of education.

Our Bureau of Research, Measurements, and Statistics was organized about twelve years ago. The objectives of the Bureau were: (1) to act as a fact-finding agency and a repository for statistics and similar data in the conduct of the schools; (2) to reveal progress or lack of progress—to act as a clearing-house for all activity in the system; and (3) to formulate and conduct experimental studies in research problems. The schools constitute a laboratory for the scientific study of educational problems. The work of the Bureau of Research is divided into four divisions—that of instruction; of administration; of planning and giving the tests and tabulating the results; and of the publication of bulletins. The Bureau is the heart of inspiration for the work of the schools.

Shortly after its organization the Bureau began its testing program. Up to 1927 that program was carried out on a voluntary basis; that is, the Bureau of Research would offer to go to a school, give the test, have the results scored, and then, if the school asked for such service, it would meet with the faculty of the school and interpret the results. During these early years a great many schools asked for that service. The purpose of going about the work in this way was to get the thing started, to get the faculties of schools thruout the city interested in a testing program. The Bureau also wished to train the teachers in following up the results of the tests and in using them in the classroom, as that is the thing we valued most in our testing program—not giving, nor scoring, nor tabulating of results—but the using of the results of the test in the improvement of the classroom instruction, supervision, and administration of the schools.

I remember that, during those days when the work of the Bureau was on a voluntary basis, after a school had been tested and the representative of the Bureau of Research had had a meeting with the faculty of the school, I was asked to sit in on a discussion. The entire school

was very low in arithmetic when compared with the standard norms. The principal explained that the reason for the poor showing in arithmetic was that there were so many pupils transferred into and out of the school during the year that they could not get the results they wished to get. That particular explanation was discussed by the principal and the faculty. Then they got to work on their arithmetic situation, and in less than two years the school was not only up to normal but ahead of normal, due to intensive work in that particular line. It was not the transfer of pupils in and out of school that was causing trouble but something else, which was tackled, and a remedy provided.

After this voluntary movement had gone on for many years and we believed the teaching force to be about ready for it, the whole program was put thru, not on a voluntary basis, but on a city-wide basis in February, 1927. This survey testing program has been carried on semi-annually since that time. The depression has had no effect in lessening our interest in the program and our desire to carry on, or in preventing our carrying it on. As a matter of fact, teachers and principals ask for it. In February, 1933, one year ago, on account of the great cut in our budget, a tremendous amount of reorganization took place. On the first of February we thought it inadvisable to put thru the testing program because conditions were so different from usual, so we omitted the testing program in February, 1933. But principals and teachers objected; they wanted something in the way of a testing program. Before the semester was over, we conducted a small testing program in May, 1933. Then in September we resumed the regular program and have continued it since then. In February of this year we gave these tests thruout the elementary grades and in some of the grades of the junior and senior high schools.

We do the testing twice a year—immediately after the opening of the first semester in September and immediately after the opening of the second semester in February. We debated for some time whether it would be well to give these tests at the close or at the beginning of the term. We finally decided on the beginning, and experience has convinced us that we did the right thing, because then the classes are formed as they will continue thru the semester. If we gave the tests at the close, classes would be broken up soon afterward and the teacher would not have the entire division under her supervision during the rest of the semester. When we give the tests immediately after the first of the semester the teacher has the results available during the semester, and can use them in doing remedial work in instruction.

There is another advantage; that is, when we give the tests at the beginning of the semester, in many cases the teacher is not the teacher who taught the class during the preceding semester. Therefore, we use the psychology that we are not testing results accomplished during the semester. We have found that this psychology helps a great deal and paves the way for better instruction during the coming semester.

The whole program is arranged in conference between the representatives of the Bureau of Research on the one hand and the Board of Superintendents on the other. For example, in a very short time we are going to discuss what the testing program is to be next September. We

endeavor to vary the program as much as possible so that it will not be concentrated on just one or two things but will cover as much of the school program as possible. This is outlined in conference between the Bureau of Research and the Board of Superintendents with the suggestions of supervisors as to what would be desirable to test. After the testing program is decided upon, the materials are ordered or printed. We try to get standardized tests wherever possible, but we have to make some of these tests ourselves because we cannot get standard tests which will exactly fit our own situation. Last February we gave our own course of study tests in history and geography in the intermediate grades in the elementary schools for this reason.

How is the testing program administered? In every elementary school we have two representatives in these programs: one of the teachers in the school is the representative for the primary grades (Grades 1 to 3) and another teacher is the representative for the intermediate grades (Grades 4 to 6). We do this because we want the teaching force to approve fully the testing program. Some places carry on the program entirely from the central office. We do not think that is advisable, because the first thing is to put it over in the school by getting the people at work in the school convinced of the value of such a program. We have a primary grade tester and an intermediate grade tester in each elementary school, who meet with the Director of Research and his assistants at times during the year. In fact, we have a course of instruction given to these testers and, if they go thru this course with the necessary reading, we give them credit on our books for the completion of a course equivalent to a college course which counts toward their credit maximum on a salary schedule. These testers actually give the tests in various rooms of the buildings and act as representatives of the Bureau of Research in the program. They meet with the director in advance in order to get the necessary instructions before administering the tests.

The tests themselves are scored by the classroom teacher and the classroom teacher enters the results of what has been done on what is called a class analysis chart. We think the preparation of that class analysis chart is one of the essential things in the whole scheme. Our research department has evolved this plan as we have gone along. The classroom teacher makes one copy of the class analysis chart for each class and these are sent by messenger to the Bureau, where additional copies are printed and delivered to the schools within forty-eight hours. The important thing is that the results are almost immediately available for the classroom teacher. During the time this work is going on, we are running day and night shifts in the Bureau of Research operating the printing presses. The classroom teacher receives a class analysis chart for her class; the principal receives one for each class in the school; the Bureau of Research receives a copy for each class in each school in the city; and the members of the Board of Superintendents receive copies for each class in each school, if they desire to have them, and also a tabulated summary of the situation. The intermediate supervisors and the primary supervisors also receive copies for the classes which they visit.

For each subject in each grade a chart is made showing the distribution of results thruout the city and showing where each individual class and school lies in relation to the city and national norms. Charts are also made showing the progress of pupils from one test to the next. These charts and records are available for use in planning for improvement in the course of study, for the reorganization of classes, and for the better grouping of pupils. One of the chief values of the testing program comes thru intensive follow-ups. The principal can get the total results for his school from the charts, which he can keep in his office and use during the semester for follow-up work.

We give these standardized tests both for achievement in ordinary school subjects and for intelligence. We do not as a rule, however, classify pupils according to their intelligence score. We classify mainly according to classroom achievement and use the intelligence score and teacher judgment only as other viewpoints. The only time it is necessary to classify entirely on the I.Q. is in the case of children entering the first grade—then we have no other measurement to use. Classification is tentative until we have sufficient classroom experience to warrant a reclassification.

We also have for each pupil a packet, an envelope in which are kept all the cards belonging to that pupil. The test results, classroom record, vocational guidance record, health record, and social information are all kept in this envelope. This packet accompanies the pupil from grade to grade and from school to school, and is kept up to date and cumulative.

This year the department of education of Johns Hopkins University began a study involving the use of test records in our schools. They came and said that they were able to secure the information they wanted in a very short time and with absolute accuracy because of the way in which these results had been tabulated and kept in form for proper study. You can find in the Bureau of Research the class analysis chart for each class in each school in the entire system.

An important result of the testing program has been the improvement in classroom teaching and in supervision. It gives something objective on which to work, and makes possible a new and more effective type of supervision. It gives those who are engaged in supervision an entering wedge toward improving the situation in the classroom and a chance to follow up individuals, and it gives the classroom teacher an opportunity to improve her instruction according to the needs of her pupils.

So far this program has been carried on most extensively in the elementary school. It has been continued in the junior high school but not to so great an extent because tests are not available. A year or two ago a counselor was brought in to be the representative of the Bureau of Research in the junior high school. In the senior high school we have not yet gone as far as this, but we hope to begin in September to do more there than we have been able to do up to the present time.

When the Bureau undertakes a problem the program is carefully planned and executed, in much the same way as an army undertakes a

campaign. The work has become so well organized that things work out almost automatically. In actual dollars and cents, the cost of this service to the people was $7,000 in 1928; $12,000 in 1931; $10,000 in 1932; and $5,500 in 1933 for the actual materials used. Almost all of this money went for the testing program. The normal cost of the Baltimore Bureau of Research is 23 to 30 cents per pupil—one-third of one per cent of the school budget. We think it is money well spent and with all the diminution in our budget and curtailment of work, this is one thing we have not curtailed. Most of the cut that has had to be made has been in the staff of the Bureau of Research.

What I have tried to do within the limits of the time is to give you an idea of how a school system can use, practically, a testing program to bring about better instruction in the classroom, better classification of pupils on the part of the principal of the school, better supervision from the central office, and better planning of educational procedure for the whole system by the educational staff.

A List of Bulletins in the Field of Education, Indiana University

The following is a list of the bulletins published by the School of Education, Indiana University.

All bulletins which are available at the present time may be secured for fifty cents ($.50) per copy, with the exception of the *Second Revision of the Bibliography of Education Measurements;* the *Bibliography of School Buildings, Grounds and Equipment; Part I; The Philosophy of Human Relations—Individual and Collective;* the *Bibliography of School Surveys and of References on School Surveys;* and the *Bibliography of College and University Buildings, Grounds, and Equipment,* which may be secured for seventy-five cents ($.75) per copy. *The Philosophy of Human Relations—Individual and Collective* and all fifty-cent bulletins of the School of Education may be obtained from the University Bookstore. The other four bulletins should be ordered thru the Bureau of Coöperative Research, Indiana University.

Proceedings of the High School Principals' Conference (November 23 and 24, 1923). Vol. I, No. 1, 1924. 85 p. (Supply exhausted.)

Investigation of Nursing as a Professional Opportunity for Girls. Part I, Technical Study; Part II, Vocational Information Bulletin. By Florence E. Blazier. Vol. I, No. 2, 1924. 69 p.

Proceedings of the Eleventh Conference on Educational Measurements. Vol. I, No. 3, 1925. 141 p.

Proceedings of the High School Principals' Conference (November 14 and 15, 1924). Vol. I, No. 4, 1925. 49 p. (Supply exhausted.)

First Revision of the Bibliography of Educational Measurements. Compiled by the Bureau of Coöperative Research. Vol. I, No. 5, 1925. 147 p. (Supply exhausted.)

Proceedings of the Twelfth Conference on Educational Measurements. Vol. I, No. 6. 1925. 76 p.

The Effect of Population upon Ability to Support Education. By Harold F. Clark. Vol. II, No. 1, 1925. 28 p.

Proceedings of the High School Principals' Conference (November 20 and 21, 1925). Vol. II, No. 2, 1925. 77 p. (Supply exhausted.)

A Cross-Indexed Bibliography on School Budgets. By Harold F. Clark. Vol. II, No. 3, 1926. 66 p.

A Comparison of the Results Made on Certain Standardized Tests by Pupils in the Bloomington High School Who Were Taught in Classes of the Same Grade by University Student Teeachers and by Regular High School Teachers. By Carl G. F. Franzén. Vol. II, No. 4, 1926. 19 p.

Proceedings of the Thirteenth Annual Conference on Educational Measurements. Vol. II, No. 5, 1926. 103 p.

When to Issue School Bonds. By Harold Florian Clark and Paul Royalty. Vol. II, No. 6, 1926. 16 p.

Students' Attitude Toward Examinations. By Grover T. Somers. Vol. III, No. 1, 1926. 48 p.

Proceedings of the High School Principals' Conference (November 12 and 13, 1926). Vol. III, No. 2, 1926. 27 p.

Index Numbers in School Administration. By Harold F. Clark. Vol. III, No. 3, 1927. 35 p.

Topical Analysis of 234 School Surveys. Compiled by the Bureau of Coöperative Research. Vol. III, No. 4, 1927. 111 p. (Supply exhausted.)

Proceedings of the Fourth Annual Conference on Elementary Supervision. Vol. III, No. 5, 1927. 64 p.

Proceedings of the Fourteenth Annual Conference on Educational Measurements. Vol. III, No. 6, 1927. 66 p.

Some Phases of the Junior College Movement. By I. Owen Foster, Harold F. Clark, Willard W. Patty, and Leo M. Chamberlain. Vol. IV, No. 1, 1927. 125 p.

Second Revision of the Bibliography of Educational Measurements. By Henry Lester Smith and Wendell William Wright. Vol. IV, No. 2, 1927. 251 p.

Bibliography of School Buildings, Grounds, and Equipment. By Henry Lester Smith and Leo Martin Chamberlain. Vol. IV, No. 3, 1928. 326 p.

Proceedings of the High School Principals' Conference (November 18 and 19, 1927). Vol. IV, No. 4, 1928. 54 p.

The Economic Effects of Education. By Harold F. Clark. Vol. IV, No. 5, 1928. 39 p.

Proceedings of the Fifteenth Annual Conference on Educational Measurements. Vol. IV, No. 6, 1928. 73 p.

Proceedings of the Fifth Annual Conference on Elementary Supervision. Vol. V, No. 1, 1928. 54 p.

Proceedings of the High School Principals' Conference (November 16 and 17, 1928). Vol. V, No. 2, 1928. 33 p.

The Development and Use of a Composite Achievement Test. By Wendell William Wright. Vol. V, No. 3, 1929. 90 p.

An Analysis of the Attitudes of American Educators and Others Toward a Program of Education for World Friendship and Understanding. By Henry Lester Smith and Leo Martin Chamberlain. Vol. V, No. 4, 1929. 109 p.

Tentative Program for Teaching World Friendship and Understanding in Teacher Training Institutions and in Public Schools for Children Who Range from Six to Fourteen Years of Age. By Henry Lester Smith and Sherman Gideon Crayton. Vol. V, No. 5, 1929. 54 p.

Proceedings of the Sixteenth Annual Conference on Educational Measurements. Vol. V, No. 6, 1929. 96 p.

Proceedings of the Sixth Annual Conference on Elementary Supervision. Vol. VI, No. 1, 1929. 73 p.

An Analysis of the Duties of County School Superintendents and Superintendents of Schools in Certain Cities in Indiana. By Henry Lester Smith and Leo Martin Chamberlain. Vol. VI, No. 2, 1929. 94 p.

Proceedings of the High School Principals' Conference (November 22 and 23, 1929). Vol. VI, No. 3, 1930. 51 p.

Coöperative Studies in Secondary Education. By Henry Lester Smith and Carl G. F. Franzén. Vol. VI, No. 4, 1930. 121 p.

Proceedings of the Seventeenth Annual Conference on Educational Measurements. Vol. VI, No. 5, 1930. 103 p.

Proceedings of the Seventh Annual Conference on Elementary Supervision. Vol. VI, No. 6, 1930. 102 p.

A Study in Teacher Supply and Demand in Indiana. By I. Owen Foster, Robert K. Devricks, Harry N. Fitch, Earl C. Bowman, and George L. Roberts. Vol. VII, No. 1, 1930. 77 p.

Proceedings of the High School Principals' Conference (November 7 and 8, 1930). Vol. VII, No. 2, 1930. 70 p.

The Philosophy of Human Relations: Individual and Collective—A Source Book. By Henry Lester Smith and Harold Littell. Vol. VII, No. 3, 1931. 326 p.

The Psychology of Human Relationships: Individual and Social—A Source Book. By Henry Lester Smith and Levi McKinley Krueger. Vol. VII, No. 4, 1931. 107 p.

Proceedings of the Eighteenth Annual Conference on Educational Measurements. Vol. VII, No. 5, 1931. 83 p.

Efficiency in College Management. By John Dale Russell. Vol. VII, No. 6, 1931. 143 p.

Bibliography of School Surveys and of References on School Surveys. By Henry Lester Smith and Edgar Alvin O'Dell. Vol. VIII, Nos. 1 and 2, 1931. 212 p.

Proceedings of the Nineteenth Annual Conference on Educational Measurements. Vol. IX, No. 1, 1932. 139 p.

Bibliography of School Buildings, Grounds, and Equipment—Part II. By Henry Lester Smith and Forest Ruby Noffsinger. Vol. IX, No. 2, 1933. 180 p.

Bibliography of School Buildings, Grounds and Equipment—Part III. By Henry Lester Smith and Forest Ruby Noffsinger. Vol. IX, No. 3, 1933. 130 p.

A Brief Summary of Literature on Leadership. By Henry Lester Smith and Levi McKinley Krueger. Vol. IX, No. 4, 1933. 80 p.

Proceedings of the Twentieth Annual Conference on Educational Measurements. Vol. X, No. 1, 1933. 98 p.

Bibliography of College and University Buildings, Grounds, and Equipment. By Henry Lester Smith and Forest Ruby Noffsinger. Vol. X, No. 2, 1934. 199 p.

Factors Affecting the Organization of School Attendance Units. By Raleigh Warren Holmstedt. Vol. X, No. 3, 1934. 32 p.

The Old World Historical Background of Religious and Moral Education in Schools. By Henry Lester Smith, Robert Stewart McElhinney, and George Renwick Steele. Vol. X, No. 4, 1934. 144 p.